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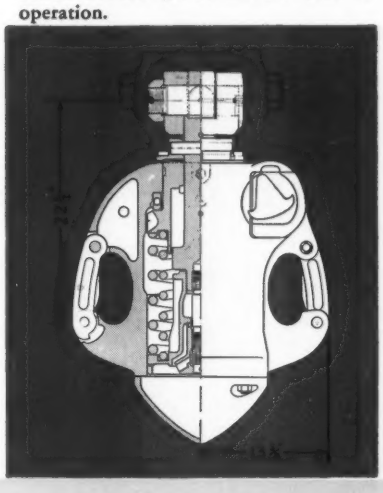

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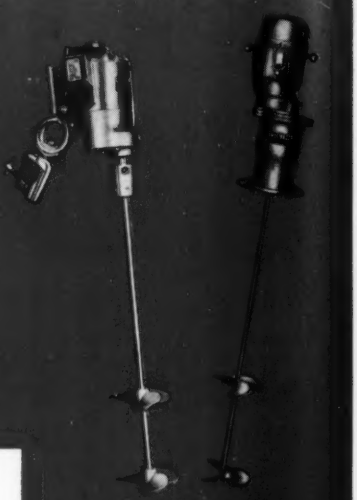

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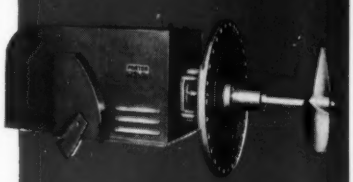

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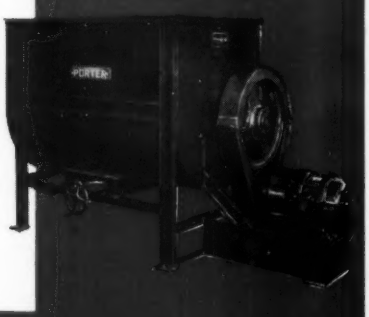

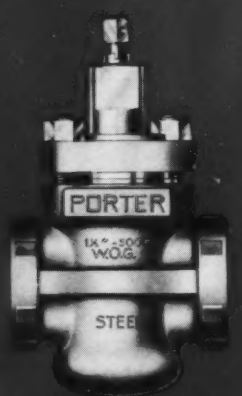

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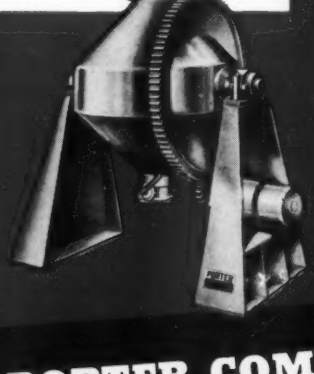

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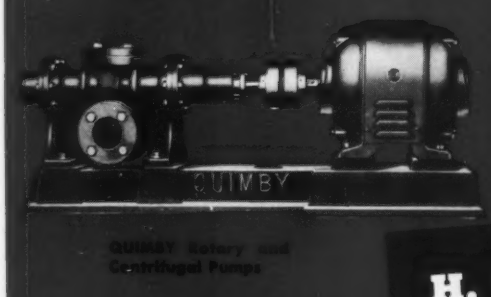

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The Military Viewpoint

ONE of the postwar conditions at Washington that mystifies oil men is the attitude of military leaders and boards as reflected in their testimony presented at several investigations and their own recommendations made directly to standing committees of Congress.

Much of the public alarm as to oil supplies has a military source. A few figures are juggled together involving reserves, production, and consumption and out come dire predictions that cause family car owners to wonder if they should not start looking for a horse and buggy, with many seriously concerned as to what might happen in another national emergency as regards oil supplies.

If there is one group over another of our national life which should have confidence that the oil business can do whatever has to be done it is the military. In two wars oil operators served the Allied forces in a manner not believed possible at the start of the conflicts.

It would seem that these accomplishments were too recent and of such great importance that they would not soon be forgotten. But there is military support for practically every suggestion that would hamstring private oil operations in favor of government controls.

Despite the overwhelming evidence that national security lies in full-scale operations in peacetime wherever oil can be found, the military talks in terms of hoarding and in billions to be spent in synthetics at a time when the materials and money are needed in petroleum expansion.

The latest suggestion comes from the petroleum subcommittee of the House Armed Services Committee. It wants the National Security Resources Board, itself a recent creation, to appoint a commission with representation from the oil industry, the consuming public, and government agencies which would recommend to Congress a "fully rounded oil policy adequate to meet the nation's present and long-range needs."

We fail to detect what this commission could do that a half-dozen existing government agencies and bureaus are not claiming to do at this time. Incidentally it always sounds well to have the public represented in an investigating committee, overlooking the fact that the consumer is familiar only with that phase of production of which he is a part.

The military did not run to the consumer or to other agencies of Government after Pearl Harbor. They went to the oil industry which knew its problems and was prepared.

We have the highest regard for our military as such. Their achievements from the birth of this country speak for themselves. But nothing is being accomplished constructively in this continuing policy of getting into the oil industry's hair as it adjusts itself to greater postwar responsibilities and gets ready for whatever the future holds.

Large Increases in Oil and Gas Taxes Proposed in Louisiana

BATON ROUGE. — Bills proposing new record-breaking taxes on oil and gas production in Louisiana were introduced May 20 in the legislature here by the new administration of Gov. Earl K. Long.

The measures were headed toward certain opposition by both the industry and other business interests in the state. However, experienced political observers here consider Long's popularity so great that his approval makes passage likely.

With approximately 485,000 bbl. daily, Louisiana now ranks as the nation's third producing state. It is felt by opponents that the new taxes, if enacted, will necessarily be passed on to the consumer, and in the long run will hinder the state's further oil development, particularly when demand for petroleum drops back to more normal levels.

The new taxes are in two bills. The severance tax on oil production is approximately tripled, and the severance tax on gas, now a flat 0.3 cent per 1,000 cu. ft., is doubled. In addition, the present gas-gathering tax, now ½ cent per 1,000 cu. ft., is raised to 2 cents. Severance tax rates on most other natural resources in Louisiana also are doubled.

The new taxes would raise Louisiana far above other producing states in the amount levied on petroleum production. Louisiana's neighboring state of Texas takes 4⅛ per cent of value on oil production plus a $\frac{3}{16}$-cent levy for the support of the Railroad Commission. New Mexico levies 2 per cent severance, 2 per cent emergency school support, and one-eighth of 1 per cent for regulation.

Louisiana's oil severance tax is in cents by gravity range. The following shows the present tax and those proposed in the new administration bill:

Degrees gravity—	Present	Proposed
22 and below	6	18
22-27, inclusive	7	21
28.1-31, inclusive	7½	22½
31.1-32, inclusive	8	24
32.1-36, inclusive	9½	26
36.1-43, inclusive	10½	28
Above 43	11	30

Much of Louisiana's oil production is high gravity and thus is taxed in the higher brackets. Condensate and distillate take the maximum tax.

The increases in the natural resources taxes, most of which are borne by the oil and gas industry, are estimated to raise $39,000,000 additional revenue. The ½-cent gathering tax on gas has been yielding about $2,000,000 a year. The new tax would bring in $8,000,000. The other taxes as proposed, based on 1946-47 collections and corrected for a 15 per cent increase in oil production, would raise an additional $33,000,000 if enacted into law.

When introduced, one of the two new tax measures was sponsored by 57 representatives, and the other by 56. This is enough to assure passage in the House of Representatives.

Louisiana also is facing a number of other new taxes to pay for Long's program which includes a veterans' bonus, a multimillion dollar highway program, and increases in old-age pensions. The new taxes include an extra 2 cents per gallon on gasoline, raising this levy to 9 cents, which would be the highest in the nation. This increase was reported favorably to the floor of the house last week after a brief hearing.

Tidelands Bill Jockeyed For Early Vote in Senate

WASHINGTON. — Unable to get committee action on the tidelands legislation, Sen. E. H. Moore of Oklahoma will call the House-approved measure up for action at the earliest opportunity afforded by the crowded Senate calendar, and it is possible that the bill will go to the White House this week or next.

President Truman will veto the bill and whether there will be sufficient strength in the Senate to override his disapproval is the $64 question.

LEDUC FIELD "LAKE" DISAPPEARING

Gradual draining of huge oil lake formed around Atlantic No. 3, wild well in Leduc field, began last week as pumps began moving more oil into pipe lines than the geysers, shown in the background, were spurting forth. Canadian conservation officials, who at first said two relief wells would be drilled in an attempt to take off part of the flow from the wild well, announced that revised plans call for flooding the well with water to be injected through Imperial No. 48. Myron Kinley, widely known blowout and firefighting expert, early this week had connected the drill pipe, stuck by a shale bridge in the surface pipe, to a production flow line. The well blew out originally March 8 and is making an estimated 10,000 bbl. of oil and 75,000,000 cu. ft. of gas a day. (For details, see The Oil and Gas Journal, May 20, page 123)

Gas Industry Turning to New Fuel Sources to Augment Supplies

by Arch L. Foster

ASBURY PARK, N. J.—Employment of additional fuel supplies—liquefied petroleum gas, cracked and "reformed" L.P.G., and cracked oil fractions—is receiving serious and scientific attention by the fuel-gas industry to augment its production to meet the rapidly increasing demands of the public for gas heat. Such were the statements made here before the 1948 Joint Production and Chemical Committee Conference of the American Gas Association at its meeting May 24-26.

Operation of an auxiliary plant for cracking L.P.G. catalytically on Long Island has proved entirely successful, S. W. Horsfield, of Long Island Lighting Co., said to the gas men.

Although the addition of butane-air mixtures into manufactured gas is limited for specific gravity reasons to a maximum of about 22 per cent, the catalytically cracked gas apparently may be employed in practically any proportions desired. This cracked gas serves well to increase supplies at distributing points far removed from the base production unit, Horsfield said. The process calls for installation in reaction tubes of Surface Combustion Corp.'s catalyst which is nickel oxide impregnated in small refractory cubes. Then hydrocarbon vapors and air, after preheating to 350° F., are introduced into these reactors and cracked at 1,800° F., cooled to 350° F., then the cracked gas enriched with L.P.G. to, for example, 540 B.t.u. heat value. Efficiency of the process ranges from 65 to 75 per cent of the charge. The process is "deally suited" to producing gas for peak loads and can be used as 100 per cent substitute gas, Horsfield claimed.

Refinery Oil Gas Used

"Reforming refinery oil gas" appears to be a satisfactory method for making gas to add to natural gas in place of water or coke-oven gas, J. W. Carroll, of Philadelphia Electric Co., and R. B. Paquette, of Peoples Gas Light & Coke Co., said in reporting the experiences of those companies. Gas oil, refinery gas, or natural gas, butane, etc., can be used with desirable results. The "reforming" operation differs from that for which the term is employed in the refinery and is equivalent to the water-gas reaction with coke and steam. The hydrocarbon material is mixed with steam and heated in a variant of the water-gas generator setup to a temperature high enough to attain up to 91-94 per cent conversion efficiency.

The reaction is essentially that of the Fischer-Tropsch reaction, converting propane and steam, for example, into carbon monoxide and hydrogen gas, with byproducts such as methane and other materials such as carbon being formed. With "set gas" of 360 B.t.u. and oil gas of 1,700 B.t.u., a finished gas is made which shows 520 B.t.u., for example, and only 5 grains of sulfur per cubic foot. Problems incident to carbon and tar deposition have been practically eliminated, it was indicated.

To supplement output of fuel gas for peak loads a mixture of 60 per cent of "oil gas" of 1,000+ B.t.u. and 40 per cent of natural gas has given good results generally, reported F. P. Lamb of Washington (D. C.) Light Co. Even a mixture containing 70 per cent of oil gas "performed in a fair manner," Lamb said. The large amounts of tar formed in making oil gas is one problem, but it is solved by Lamb's company by storing and burning as boiler fuel. Other observers pointed out that unless this tar can be utilized economically the advantage of using oil for gas is lessened seriously from an economic viewpoint.

Therm Sales Favored

It is highly desirable to sell fuel gas on a B.t.u. or "therm" basis, the basis of actual heating value, rather than in terms of cubic feet. P. V. Mullins and R. W. Wilson of the U. S. Bureau of Mines, said in discussing the problems of removing nitrogen from natural gases. In this manner adequate returns for the cost of nitrogen removal, loss of volume and improvement of heating value may be lost to the producer and distributor. An alternative is to mix low B.t.u. gas with high value gas. The sale of gas on heating value is standard practice in many companies, the authors said.

Gas utilities and distributors have created an increasing demand for L. P. G. without checking properly to see if increased production is available to care for this expanded demand, H. Emerson Thomas, of Westfield, N. J., told the A.G.A. conference. With the higher prices now being paid producers for their L.P.G., the economics of the situation appears to be fairly well cared for, Thomas said. Additional amounts of L.P.G. will be produced, which may keep pace approximately with the increase in demand, but critical supply-demand conditions may be expected for the winter of 1948-49, with conditions improving by 1949-50, the speaker asserted.

Additional L.P.G. storage must be built by utilities for off-peak or summer seasons, and this storage must be great enough to carry the utilities through peak winter needs, he said.

The Dayton-Faber oil-gas process, operating in a 5,000-cu.-ft.-per-hour pilot plant can produce from heavy petroleum residues a heating gas varying from 500 to 1,100 B.t.u. per cubic foot, W. F. Faber stated in presenting data on the results of this large-scale experimental work. Conversion efficiencies vary from 70 to 80 per cent depending on the properties of the charge oil. These results can be attained at 25 per cent less cost and with half the operating personnel required with conventional water-gas plants. The process is continuous, needs no relief gas holder, no steam, and no external heat or solid fuel. It will make 300-500 B.t.u. gas from air and oil instead of oxygen and oil, will reform natural gas or still gas.

The process is made more practical and economic by recent developments in making cheap oxygen. The process mixes gas oil with preheated oxygen or oxygen-air mixtures and the oil is cracked at 1,300°-1,600° F. in a generator; it is washed after preheating incoming oxygen, scrubbed and desulfurized, the sulfur appearing mainly as sulfur dioxide and trioxide, easily removed with water. From 0.5 to 1.5 gal. of tar per 1,000 cu. ft. of oil is formed, and the tar quality compares favorably with water-gas tar. A plant to produce this type of gas will cost approximately half that of a typical carbureted water gas plant, Faber stated.

Acreage Limit Raised for Prospecting Indian Lands

WASHINGTON.—An order raising the limitation on the acreage of Indian lands that may be used for oil exploration, to 25,000 acres per reservation, has been signed by Interior Secretary J. A. Krug. The order will be effective in all of the Indian states except Oklahoma, where there is no acreage limitation.

Previously the maximum available for exploration was held to 15,360 acres except in Oklahoma, where the limit was 20,000 acres.

The increase in acreage was granted, the department explained, because competition was too great under the former limitations.

Executive Pressure Forcing Pipe Exports, Brown Tells Committee

WASHINGTON.—Charges that pressure by the executive departments has been responsible for steadily increasing exports of oil pipe were laid before the Senate small business committee last week by Russell B. Brown, general counsel of the Independent Petroleum Association of America.

Brown declared that despite the avowed intention of the Commerce Department to limit pipe exports, they have been increasing steadily and in the first quarter of 1948 alone ran to one-third of the total 1947 shipments.

The hearings last week were for the purpose of hearing Brown, OGD Director Max W. Ball, and Clifford A. Hahn, head of the oil division of the Office of Industry Cooperation, and other Commerce Department officials. It is planned this week to hear the governors of 13 states most gravely affected by the steel shortage, and wind the hearings up with the questioning of members of the steel products advisory committee formed by the Commerce Department.

Brown testified first as chairman of the National Petroleum Council Committee on Petroleum Industry Steel Requirements to explain the estimates prepared as the basis for an allocation to the industry by the steel manufacturers.

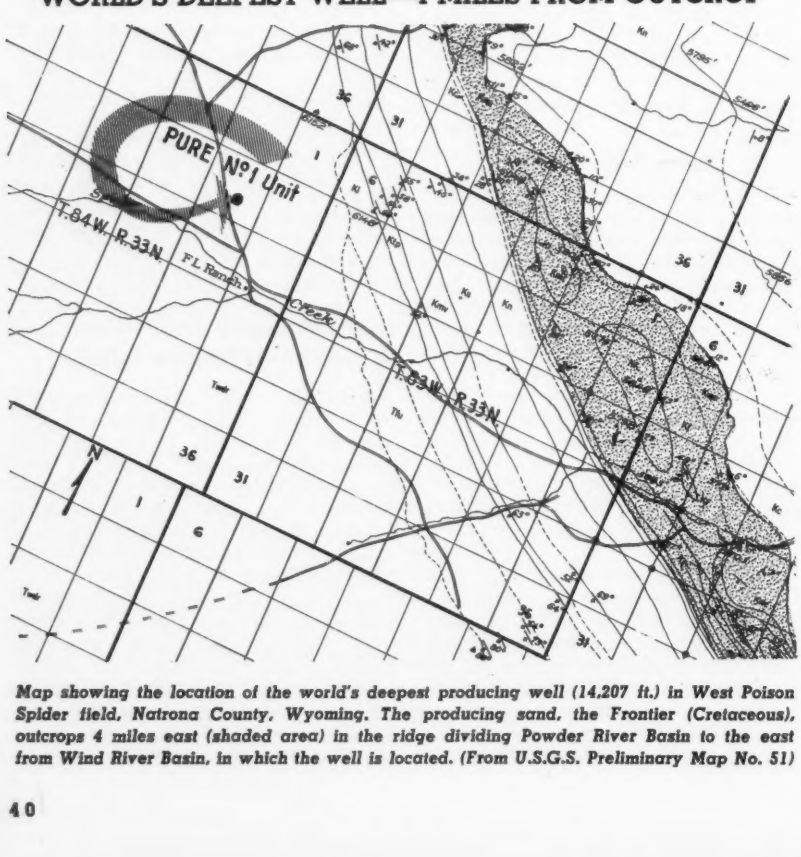
Thereafter, he spoke as general counsel of the I.P.A.A. and told the committee that if the steel asked for is channeled to the producing industry and not into inventory it will be possible to drill 40,000 wells this year instead of the scheduled 37,000 and the producers "will be begging the refiners to take their oil."

Hahn testified that to facilitate action on the industry's steel needs, the estimates of requirements had been divided into two categories, Program A, which covered 6,680,444 tons of steel annually for production, refining, transportation, and marketing, and Program B, totaling 3,684,237 tons for transportation, marketing, and foreign operations. To the latter has been added 470,700 tons of steel for the manufactured gas industry, which was not included in the NPC estimates.

Program A, Hahn said, is the basic requirement, the necessity of which is beyond question, while Program B includes some items already or later to be provided for, at least in part, in other programs.

OIC discussions with the steel industry indicate that the latter will meet all domestic requirements for drilling 37,600 wells this year.

WORLD'S DEEPEST WELL—4 MILES FROM OUTCROP



Map showing the location of the world's deepest producing well (14,207 ft.) in West Poison Spider field, Natrona County, Wyoming. The producing sand, the Frontier (Cretaceous), outcrops 4 miles east (shaded area) in the ridge dividing Powder River Basin to the east from Wind River Basin, in which the well is located. (From U.S.G.S. Preliminary Map No. 51)

15 Wells Now Drilling Off Louisiana Coast

by Dahl M. Duff

District Editor, Houston

FIFTEEN wells are either drilling or structures for them are now under construction off the Louisiana Coast, newspapermen and oil writers learned last week during a tour of active offshore areas.

Work under way indicates that the total number of drilling wells off Louisiana soon will be raised to 24. The writers were guests of Humble Oil & Refining Co.

The visit to Humble's giant drilling platform 8 miles off Grand Isle, in Jefferson Parish, was the high point of the 3-day tour. The company used the occasion to announce that the well had reached the top of a salt dome at 7,607 ft. It will be taken about 1,000 ft. into salt to determine if the location is on an overhang of the dome. A show at 7,094-7,104 ft. will be tested, and further directional drilling may be carried out.

The $1,200,000 Humble platform is the largest yet constructed off the Gulf Coast *(The Oil and Gas Journal, March 18, page 123)*. It may be the last of its type for wildcat operations in the Gulf. Indications are that smaller structures with much equipment and crew housing on an auxiliary barge or converted landing ship, is now considered more economical. This is the type Humble is currently building at four other locations off the Louisiana Coast. A 38 by 66-ft. structure for the shallow test, Grand Isle 2, is being built about 2 miles northeast of Grand Isle 1. A 50 by 150-ft. structure and a 38 by 66-ft. structure is under construction for Caminada Pass 1 and 2, west of the Grand Isle area. Humble also is building a 50 by 150-ft. platform for a test in the Tiger Pass area.

The newsmen's tour also included talks by various Humble officials, among them Harry C. Weiss, new board chairman, and Hines Baker, new president. Baker, who is known as the industry's outstanding authority on the legal aspects of current tidelands developments, reviewed the threats contained in last year's Supreme Court decision and pointed out the ways in which the proposed federal leasing legislation will impede oil development in the Continental Shelf.

this week

INTERNATIONAL—Oil companies with concessions in Bahama Islands seeking a year's extension to exploration licenses. . . . Results of last year's airborne magnetometer survey being made available. . . . ¶N. V. de Bataafsche Petroleum Mij. plans to triple capacity of Pernis plant by 1953. . . . ¶Creole Petroleum Corp.'s 155-mile crude-oil line from Bolivar Coastal Fields to Amuay Bay is scheduled for completion by end of this year. . . . About 30 miles of the line have been welded and about 50 miles laid. . . . Welding is progressing at nearly 1 mile per day. . . . ¶Tide Water Associated Oil Co. will begin using own tankers to pick up Middle East oil from Saudi Arabia. . . .

CONGRESS—Representatives of American oil-producing nations view international problems of the industry during 3-day session. . . . Jose Martorano B. outlines policy of more rigid control for oil industry in Venezuela. . . . Sen. Antonio J. Bermudez, director of Pemex, cites gains made by Mexican oil industry under national control. . . . Colonel Thompson, chairman of Texas Railroad Commission makes a plea for minimum of government interference. . . . H. B. Fell, executive vice president of I.P.A.A., says the industry under the competitive system of free enterprise in the United States has made more progress than in any other country. . . . Gerald Westby, president of Seismograph Service, shows where exploration costs are mounting. . . . Knappen, Gulf Oil Corp., indicates new developments in the industry's equipment will conserve over-all production costs. . . .

PIPE LINES—Socony-Vacuum awards contract for 165-mile, 8-in. products line from Malvern, Pa., to Binghamton, N. Y. . . . Work on project begins next week. . . . ¶Construction to begin early next month on El Paso Natural Gas Co. 248-mile, 24-in. extension from Permian basin area of New Mexico to Dumas, in the Texas Panhandle. . . . ¶Triangle Pipe Line Co. puts in operation its 141-mile products line from Carthage, Tex., through Shreveport, La., area to El Dorado, Ark. . . .

REFINING—Large-scale operations begin at the Sun Oil Co.'s new terminal at River Rouge, Mich. . . . 840,000 gal. of gasoline delivered from the company's Toledo refinery. . . . ¶The Texas Co.'s Port Arthur, Tex., refinery now receiving crude from the Middle East. . . . ¶Blaw-Knox gets contract for completing Bureau of Mines coal-gasification pilot plant at Bruceton, Pa. . . . British American Oil Co., Ltd., begins construction of its $15,000,000 refinery at Montreal East. . . . Completion scheduled in 2 years.

TRENDS—Crude runs to stills hit new all-time high of 5,640,000 bbl. daily week ended May 15, topping steady upward trend of past 6 weeks. . . . Previous record was 5,637,000 for one isolated week first of this year. . . . ¶Production of finished gasoline did not set record because of rebuilding unfinished and cracking stocks depleted by 5,000,000 bbl. during January and February. . . . ¶Refinery stocks of major products increased 1,777,000 bbl. during week. . . . Gasoline stocks dropped 928,000 bbl. but kerosine rose 493,000, distillate 1,150,000, and residual 1,062,000 bbl. . . . ¶Well completions totaled 763 week ended May 28 of which 104 were wildcats, compared with 614 total and 93 wildcat completions corresponding week last year. . . . ¶Crude production was 5,435,325 bbl. daily week ended May 28, an increase of 18,260 bbl. over revised figure for previous week. . . .

This is the spectacle that occurred off the Louisiana Gulf Coast last week when more than 100 news writers and Humble Oil & Refining Co. officials visited Humble's giant drilling platform 8 miles off Grand Isle in Jefferson Parish. (See story, opposite page.) At one time seven of these waterspouts swirled through the air about a mile and a half from the Humble drilling structure. Though the equipment did not appear to be endangered, the phenomenon emphasized the natural hazards to be encountered in drilling operations in the open, unprotected water in the Gulf of Mexico. (Picture, courtesy Humble Oil & Refining Co.)

Varying Oil Policies in the Americas Defended by I.P.E Congress Speakers

by Ted Armstrong

OIL ideologies ranging from strict national control to unlimited free enterprise were praised and defended by representatives of American oil-producing nations last week before national and international delegates attending the International Petroleum Congress.

Sitting in open forum the delegates heard:

An outline of a policy of more rigid control of the oil industry in Venezuela by Jose Martorano B., technical oil director in the ministry of fomento.

Sen. Antonio J. Bermudez, director of Petroleos Mexicanos, cite gains made by the Mexican oil industry under national control.

A plea for free enterprise with a minimum of government interference in the United States from Col. Ernest Thompson, chairman of the Texas Railroad Commission.

An outline of a new oil code to encourage the influx of capital and technical know-how into Canada from the United States by N. E. Tanner, Canadian minister of land and mines.

A statement by H. B. Fell, executive vice president of the Independent Petroleum Association of America that the oil industry under the competitive system of free enterprise in the United States has made greater progress than the industry in any other country.

Praise from Carlos R. Vegh Garzon, Uruguay, president of the South American Petroleum Institute, of the operation of the Uruguayan refinery, under complete control of the government.

Chairmen of the forums during the 3 days in which the congress was in session included W. H. Love, editor and publisher of the Petroleum Engineer, Dallas; Ray L. Dudley, president of Gulf Publishing Co.; and P. C. Lauinger, publisher of The Oil and Gas Journal and Petroleo Interamericano. Alf G. Heggem, Tulsa engineer and vice president of Orbit Valve Co., was in over-all charge of the congress.

New Venezuelan Policy

Amplifying earlier statements by Juan P. Perez Alfonso, Venezuela's minister of fomento, concerning the changing view of the Venezuelan Government toward that country's oil resources, Martorano outlined that government's policy and previewed changes to come.

The present policy, he said, may be summed up in five points.

1. The petroleum law of 1943 will remain in force as a guarantee against expropriation of petroleum-industry investments.

2. While respecting the integrity of concessions already granted, no new concessions will be awarded. In addition, the Government is contemplating the creation of a state organization empowered to engage in exploration or development of oil lands, to prevent operating companies from draining oil from under adjacent government lands.

3. The government will undertake maximum conservation of resources "through making sure that the oil is produced at the maximum efficient rate."

4. The government will work toward securing "maximum participation in the profits resulting from the exploitation of our soil, consonant with the maintenance of a healthy and aggressive oil industry." It will continue, if necessary, he said, to sell its royalty oil on the open market as a means of securing maximum return.

5. Venezuela will "strive to foster and encourage industrialization." In this direction, Martorano said, the government already has reached agreements with five oil companies providing for the construction of refineries. In addition, he said, the construction of a refinery to process royalty oil for Argentina is under consideration.

The country, he said, also is "resolved to put an end, within a reasonable time, to the waste" of natural gas, of which in 1947 only 13 per cent of the total output was utilized.

Mexico Welcomes Aid

Mexico's oil policy, Bermudez said, welcomes the entry of foreign oil capital, but only in accordance with the "policies and principles established by our laws."

"In Mexico," the Pemex director said, "we have laws which reflect the will of our people, and we believe that the exploitation of our oil resources should, primarily, derive a direct benefit for our country by means of a national control.

"However, within these limitations, there can be a very valuable cooperation in the form of technical, practical, and financial assistance. . . . Of course, a safe and fair compensation should be established as is recognized by business principles everywhere."

Reviewing the progress of the Mexican industry since the expropriation in 1938, Bermudez said crude-oil production has increased from 107,000 bbl. daily to 167,000 bbl. daily, with the expectation that 1948 production will average 200,000 bbl. daily.

Refining capacity, which was 95,000 bbl. daily in 1938, is now 135,000 bbl. per day. A gas line now being built will bring formerly wasted gas from Poza Rica field for utilization in Mexico City.

Looking to the future, Bermudez said it reasonably can be expected that within a few years Mexico "will be producing at a rate sufficient to take care of its domestic demands and have available for export in the Western Hemisphere an equal amount."

"The only possibility that we can envision which might deter us from our goal," he said, "is that we do not receive a sufficient allocation of steel products to take care of our requirements."

Mexico should be supplied steel as a matter of hemispheric defense, he said, since, because it is relatively unexplored geologically and geophysically, "we can develop for the Western Hemisphere these reserves at a faster rate than in almost any other country."

Egloff Addresses Congress

Dr. Gustav Egloff, director of research for Universal Oil Products Co., who followed Bermudez to the speakers' stand on the final day of the congress, predicted that Mexico, assisted by technical experts from the United States and aided in other ways, would reach a daily crude-oil production of 1,000,000 bbl. within the next 10 years.

The widely known scientist strongly criticized government planners in the United States who attempt to "improve" the oil industry through increased federal control and scoffed at government plans to create a synthetic-fuels industry.

"This industry should not come into being until we have the complete know-how and until the economy of its processes are competitive with

Mexican delegation to I.P.E. attending a session of the Congress addressed by Senator Antonio J. Bermudez, director general of Petroleos Mexicanos. Front row: Francisco Inguanzo, J. C. Lanz Margalli, Alfonso Barnetche, Alf G. Heggem, director of the Congress, Sr. Bermudez, Dr. Gustav Egloff of Universal Oil Products Co. who shared the platform with Bermudez, Jose Colomo, Alfonso Alavez Bouret, Leopoldo Flores, D. Estrop. Middle row: Alfredo Attolini Lock, Juan Vara Orozco, Jose Dominguez Marquez, Jesus Ruiz Elizondo, Santiago Hernandez, Jose Mendivil, Javier Lunas, Carlos Alverez Garcia, Alvaro H. Leal, Miguel Guiroz, J. de la M. Gonzalez. Back row: Guillermo de la Garza, Armando Moran, M. L. de Guevara, Dr. Henri Huber, Eduardo Rugama, J. Novelo, L. N. Coronado, Jose Aleman Alvarez, Antonio Echeverria, Vicente Fuentes, R. G. Granados

those of crude oil," Egloff declared. Evolvement of a synthetic-fuels industry, he asserted, will come faster through industry efforts, which already have a 10-year research history, than through proposals now being made in government quarters.

The supreme court decision awarding the federal Government jurisdiction over the tidelands was described by Egloff as "one sure way of slowing up progress" in obtaining oil from the submerged lands.

Those who continually forecast "shortages" also came in for criticism by the scientist, who predicted the United States "will have oil to supply whatever demand may exist 100 years hence."

Declaring the first fear of total depletion of oil reserves "within 5 years" was voiced "when oil was being sold in bottles for medicinal purposes," Egloff said the cry has persisted at regular intervals, while both the nation's annual consumption and the total of its proven reserves have continued to increase.

Fell Attacks Controls

Fell, representing the I.P.A.A., took to task those in government and elsewhere who advocate increasing government controls as a means of alleviating "shortages" and providing better distribution of supplies.

"Those who now suggest government control, no matter how honest their intentions, should understand that the oil and gas industry in the United States is now merely convalescing from the very disease they suggest as a remedy — government control," the speaker said.

He warned against letting government get a foothold in the oil industry, declaring: "The imposition of any federal control is merely the first step toward additional federal controls and the ultimate nationalization of industry which would finally result in the complete destruction of our form of government."

Under the competitive system of free enterprise, he said, the industry in the United States has produced 65 per cent of all oil produced in the world from 20 per cent of the earth's productive oil territory, and American know-how and venture capital "have found and developed the great majority of petroleum reserves located outside the United States."

"Nationalization of the industry has actually been tried, and in every instance throughout the world it has proved a dismal failure in comparison with the results secured from our competitive system of free enterprise," he asserted.

Citing Russia as an example, Fell said the U.S.S.R. in 1900 produced 20 per cent more oil than the United States. "Under nationalization, however, 47 years later, Russia was producing less than 10 per cent as much oil as the United States." The "ambitious" Russian 5-year plan now has as its 1950 goal, he said, "a production about one-fourth of what the state of Texas alone is already producing.

Thompson Lauds Industry

Deploring the "impatience" of the American people, Col. Thompson said many ill-advised persons were clamoring for government control of the oil industry just because of a "few spot shortages of gasoline and heating oil."

While no steel was available to the industry "to bring the oil plant up to its needs" from 1941 to 1945, he said, "still every war need for oil was promptly met."

"Had the generally predicted depression come, as was so direfully forecast, we would have had a surplus of oil," Thompson declared.

As a matter of fact, he said, the oil industry "has done one of the most remarkable supply jobs in all history," and today "there is no industry better prepared and better fortified to meet the growing needs of the coming years in a fair way."

Vegh Garzon, who was first speaker before the congress on May 17, pointed to the operation of Uruguay's refinery as "the most interesting example of what can be obtained by the frank and friendly cooperation between private interests and the nation." "That is," he said, "in that refinery, for more than 10 years now all the crude oil imported by the private companies from their oil fields in Venezuela, Peru, and Ecuador has been refined and later marketed for local consumption through those same companies and Ancap, the state organism which regulates the earnings in a fair way and practically eliminates any financial risks for the private capitalists."

The speaker urged the creation in the United States of a North American chapter of the South American Petroleum Institute, of which he is president, as a means of fostering "mutual continental understanding of our petroleum activities."

Invitation to Canada

Tanner told the delegates that the Canadian Government has extended an open invitation "to everyone interested in the industry" to come to Canada.

Pointing out that Canada now produces only one-tenth of the petroleum it needs, Tanner said United States capital and ingenuity are being welcomed to participate in the development of "the greatest unexplored area on the North American continent today."

The Canadian representative also cited the government's present policy of allowing any outside company to acquire two exploration permits, each covering 10,000 acres. It is considered essential, he said, that new sources of oil be found, and the government is convinced, he continued, that maximum development can be obtained "only through wholesome competition."

International

WORLD-WIDE OIL DEVELOPMENTS

Tide Water Tankers to Carry Middle East Oil

NEW YORK.—Whether Tide Water Associated Oil Co. will continue to purchase high-sulfur Middle East crude oil from California Texas Co., Ltd., depends largely upon whether Tide Water decides to install necessary cracking and treating equipment to process this type of crude oil.

The company's Bayonne refinery in New Jersey, which is the destination of the Middle East crude imports, can top the high-sulfur crude but is not equipped to crack it, a Tide Water execuitve said.

The announcement that Tide Water will lift Middle East crude oil was made this week by the company's president, William F. Humphrey. Using their own tankers, Tide Water will load at either Sitra, loading port for Bahrein Island, or Ras Tanura, Saudi Arabia.

The over-all tanker-transportation situation and the availability of crude oil in the United States and elsewhere are other factors which Tide Water will consider before contracting for additional cargoes of Middle East crude oil next year, it was said.

Tide Water's first cargo will be lifted this June and arrive at Bayonne in July. "The purchase and importation of Middle East crude are necessary because of the short supply of Domestic crudes in the Gulf Coast area," Humphrey said, "and are to supplement the company's supply of domestic crude in order to help meet the increased demand for petroleum products in the eastern marketing area served by the company."

Kirkuk-Tripoli Crude Line Again Operating

Iraq Petroleum Co., Ltd.'s, Kirkuk to Tripoli, Lebanon, crude-oil pipe line has resumed operations after a brief strike. The Kirkuk to Haifa segment was forced to shut down because of the political turmoil in Palestine and reportedly is still not operating.

Except for about 3,000 bbl. daily of the 42,000 bbl. daily which is delivered to Tripoli, all of this crude is being lifted for European destinations. The shutdown of the Haifa end of this line and the suspension of the 90,000-bbl. daily refinery there is expected to have a serious effect upon the oil phase of the Marshall Plan. The small topping plant at Tripoli belongs to I.P.C. Its products are sold for local consumption.

A report from Lake Success states that the British Government is understood to have informed the United Nations that certain assets of the Palestine Government, now held in London, will not be released until Great Britain is assured that British and other foreign economic interests in Palestine will be respected. The assets held in London are believed to total about £50,000,000 or $200,000,000.

The British Government's interests in I.P.C. are through Anglo-Iranian Oil Co., Ltd., of which it owns 56 per cent. Anglo-Iranian owns 23.75 per cent of Iraq Petroleum Co. and 50 per cent of the Haifa refinery.

Venezuela Seeks Loan of Texas Conservation Expert

In a letter to Olin Culberson, member of the Railroad Commission of Texas, Dr. Juan Pablo Perez Alfonso, Minister of Fomento of Venezuela, seeks the loan of the services of Jack Baumel, chief engineer of the oil and gas division of the Texas commission. The government head of oil administration in Venezuela also asked that the Texas commission accept a number of young Venezuelans for training in the methods used in the administration of the state's conservation laws.

The letter followed a recent visit to Austin by Dr. Jose Martorano Battisti, in charge of the petroleum section of the Ministerio de Fomento, and Dr. J. L. Cordero, also of the section, during which they were the guests of Commissioner Culberson. The Venezuelans expressed interest in several phases of the work being done by the Texas commission and seek the services of Baumel who has been in charge of the engineering phases of the oil and gas division for several years. Culberson expressed himself in favor of the plan, which has not yet been brought to the attention of the entire commission consisting of three members.

Argentine Fuel Imports At Record High Levels

Argentine imports of crude oil, petroleum products and coal during March broke all postwar records and exceeded by a wide margin the average for recent months.

Total fuel imports for March totaled 686,815 tons, of which 127,166 tons represented crude oil and 284,553 tons were petroleum products. Computed into approximate number of barrels daily, Argentina imported a total of 105,000 bbl. of crude oil and petroleum products in March compared with 66,000 bbl. during February.

Imports of crude oil and petroleum products into Argentina during March 1947 approximated 79,000 bbl. daily.

The following figures show the breakdown of petroleum products as well as the amounts of crude oil and coal imported for 2 months of 1948 and for March 1947:

	March 1948	February 1948	March 1947
Fuel oil	270,508	159,088	162,156
Crude oil	127,166	65,963	100,299
Diesel oil	1,935	.....	13,286
Gas oil	.....	.....	2,587
Naphtha	12,110	32,216	30,826
Coal	275,096	145,463	101,008
Total	686,815	402,730	410,162

Richmond Will Build Venezuelan Refinery

Richmond Exploration Co., subsidiary of Standard Oil Co. of California, will build a 25,000-bbl. refinery near Maracaibo, according to terms of a contract recently signed by Richmond and the Venezuelan Government.

Similar contracts were signed last year with Creole Petroleum Corp. and the Royal Dutch-Shell group.

In a talk last week before the International Petroleum Congress in Tulsa, Jose Martorano B., technical director in the ministry of fomento, said arrangements are being completed with five companies for construction of refineries in Venezuela. *(See page 42.)*

Completion of B. C. F.-Amuay Bay Line Planned by Creole This Year

BY the end of 1948 Creole Petroleum Corp. expects to have completed its 155-mile, 24-26-in. crude-oil line from the Bolivar Coastal Fields to Amuay Bay on the Paraguana peninsula.

Initial daily throughput of this line probably will be 200,000 bbl., this being stepped up to 300,000 bbl. daily when the Dabajuro pumping station is completed. There will be only two pumping stations on this line, H. W. Haight, a Creole director, explained last week following the company's annual stockholders' meeting in New York. When this line is in full operation it will release tanker tonnage equivalent to 11 T-2 type tankers, according to R. W. Miller who has just been named a Creole director.

Approximately 30 miles of this line have been welded and about 50 miles laid, Haight explained, adding that welding is progressing at the rate of about 1 mile a day. Fourteen miles of this line will be laid across the turbulent Gulf of Coro where the waters are relatively quiet only during September and October of each year.

New Docks in Use

The main dock and storage tanks at Amuay Bay, where Creole is building a 60,000-bbl. daily refinery, were completed to the point where Creole was able to transship crude oil in April. A. T. Proudfit stated that this increases the company's capacity for transshipment, improves the efficiency and provides for some cash saving.

Construction of the new refinery at Amuay Bay is going forward on a large scale, Proudfit said, though the company has not yet reached the construction peak which probably will be hit sometime next year. Crude oil in excess of 60,000 bbl. daily, which will be sent through the 155-mile pipe line when completed, will be exported, largely to European destinations. Commenting on the frequently-asked question, "what is Middle East oil going to do to Venezuelan oil?" Proudfit said:

"We can be quite sure that when the Middle East gets into high gear Venezuelan oil will meet strong competition in certain European markets. However, it does not appear to us that this development is of immediate concern. We feel fairly certain that demand for Venezuelan crude will be favorably affected by world supply and demand for some time to come."

Proudfit admonished stockholders to bear in mind "that our business and market are always susceptible to the effect of new discoveries in areas outside of Venezuela." He also stated that the demand for petroleum products through Latin America was ever on the increase.

Creole's wildcat drilling during the first 4 months of 1948 was concentrated on the evaluation of its present new field prospects, Proudfit said, adding that four wildcat wells have been spudded on exploration acreage of which three are presently active and one just completed as a dry hole. Ten locations remain to be drilled this year, he said, with seven of them being shallow for geological control. The company has spudded seven wells on development acreage in search of new fields or in search of production from deeper horizons beneath present producing fields. None of these has yet been completed.

Prospects "Excellent"

Wildcat drilling in 1948 has not yet proven any addition to reserves, the company's president stated, "but prospects are excellent." Two deeper pool tests in the Bolivar Coastal Fields have possibilities of discovering prolific production in the underlying Eocene or Cretaceous sediments, and the two wildcats in the eastern part of the Tablazo District have as their objectives the discovery of Cretaceous limestone production similar to that of the La Paz-Mara areas. Proudfit also stated:

"Of special interest is the Alturitas prospect in southwestern Zulia, about 35 km. (22 miles) west of Lake Maracaibo. Here a large structure, covered by Creole concessions, has been outlined by geophysical methods and preparations are being made to spud a well on this prospect during 1948. The recent discovery successes by others in the region to the north and the probability of being on the Cretaceous productive trend makes this prospect extremely attractive.

"Estimated additions to reserves during the first 4 months of this year can be based only on extensions to present proved areas by step-out drilling. Preliminary estimates indicate that approximately 4,000,000 bbl. were added to Mara field; 7,000,000 to the Bolivar Coastal Fields; and 15,000,000 bbl. to Quiriquire field. It is anticipated, however, that the additions to the proved reserves at year end will be of much greater magnitude due to the aforementioned wildcat drilling and to additional scheduled stepout drilling from present proved areas."

Proudfit explained that while Creole has continued to locate considerable new reserves each year, "it is significant that the cost per barrel of reserves which we developed last year was 87 per cent higher than in 1945."

Texaco to Have Huge New Tanker in Use Next Year

Further indication that The Texas Co. expects to be importing substantial quantities of crude oil from foreign countries into the United States, within the next year, was the announcement last week that by July 1949 one of the world's largest tankers is expected to be completed and in operation by that company.

This tanker, one of four which the Bethlehem Steel Co. will build for Texaco, will have a capacity of 240,000 bbl. and a DWT of 28,000. Standard Oil Co. (N.J.) has contracted for the construction of four 26,000 DWT tankers with a carrying capacity of 228,000 bbl. of light-gravity cargo.

The new Texaco tankers will have a displacement of 36,250 tons, a speed of 16.75 knots and a horse power of 12,500. The engine will be a double reduction geared steam turbine and the propulsion single screw.

Stanolind Opens Western Canada Division Offices

Stanolind Oil & Gas Co., Tulsa, has officially announced its entry into oil activities in Western Canada with the establishment of Canadian division offices at Calgary.

C. F. Schook is in charge, his staff including A. R. Winzeler, division geologist; Ian M. Cook, geologist; J. H. McKeever, geological scout; W. B. Longshore, senior landman; R. W. Craig, senior geologist; T. B. Hewitt, landman; J. H. Helland, geological scout, and E. J. Hughes, office manager. The company is planning an extensive program of exploration, leasing and wildcat drilling in the Canadian West.

Slight Gain Is Shown In Colon Production

Venezuelan crude oil production of Colon Development Co., Ltd. (Royal Dutch-Shell) for the 5-week period ending May 3 totaled 399,639 bbl., or approximately 11,400 bbl. daily. This compares with a production of 317,822 bbl., or approximately 11,350 bbl. daily, for the 4-week period ending March 29.

Socony-Vacuum's complete assembly of two barges and two tugs are shown above in operation in the middle of the first channel of the Magdalena River crossing. Two identical 90 by 28 by 8-ft. shallow-draft flat-top barges were lashed end-to-end. Two 70-ft. anchor barges were used to hold the work-barge in place

Difficult Crossing of Magdalena River Made to Provide Cantagallo Outlet

by Warren W. Burns

MANY weeks of preparation and careful planning were required by Socony-Vacuum Oil Co. of Colombia before laying a pipe line across the Magdalena River to provide an outlet for crude from the company's Cantagallo concession.

Although it took only 66 hours to make the actual crossing with 6,250 ft. of pipe, company engineers state that it was an extremely difficult task. Because of the nature of the river bottom and the swampy shores, special equipment and methods had to be improvised. The line was placed in operation last December.

This project had to be executed during peak flood in order to have sufficient water to keep tugs and barges off the sand bars. Considerable delay was experienced by heavy rains. Seven weeks were consumed in the preparation of the pipe and in making other necessary arrangements before the actual crossing was started.

Socony-Vacuum's Cantagallo concession, on which crude oil was first discovered commercially December 30, 1943, lies on the west bank of Colombia's Magdalena River, some 280 miles from the Caribbean coast. Upwards of 12 wells have been drilled with current production coming from fewer than 6.

In order to place this concession on production it was necessary to lay a pipe line across the Magdalena River from the south side of the small village of Cantagallo to the east bank of the river near the town of Puerto Wilches where it ties into the Andian National Corp.'s 10-in. trunk line.

The river at that point is 6,250 ft. wide and has two channels with a wide sand bar between them. There is also a stretch of very shallow water on the east side of the river. In view of the nature of the river profile it appeared nearly impossible to pull the pipe line across. Furthermore the lack of solid ground on either side of the river, for operating tractors, made it still more difficult to attempt such a job. For this reason it was decided to weld the pipe in sections on the west bank and then weld these sections together on board barges and lay the pipe on the river bottom as the barges were being towed across the river.

The pipe used was 4½-in. o.d., 15.35 lb. per ft., Range 2, second-hand drill pipe with an i.d. of 3.826 in. The tool joints and upsets were cut off and the ends of the pipe beveled in a lathe to A.P.I. specifications. The pipe then was welded in sections of five joints each, with three beads per weld, and strapped with four 1 by ¼ by 12-in. straps across each weld, spaced at 90-ft. in-

tervals. This system of welding was thoroughly grief-tested and proved satisfactory before the project was started.

Two identical 90 by 28 by 8-ft. shallow-draft flat-top river barges were lashed end-to-end with a 1-in. steel cable and turnbuckles. On the forward end of the barge assembly 6-in. pipe skids were welded to the deck to accommodate all the pipe sections and to facilitate the movement of the pipe line when the barges were moved ahead after each weld.

On the after end of the barge assembly a 30-ft. section of 9⅝-in. casing was rigidly welded to the center of the deck to act as a gun barrel through which the 4½-in. pipe was discharged to the river bottom after each section was welded. The gun barrel was belled out at each end to give the 4½-in. welds full clearance.

Between the forward end of this gun barrel and the after end of the 4½-in. pipe on the racks, a 5-ft. square hole was cut in the deck of the barge to be used as a "bell hole" for welding each additional section after the barges were moved forward a distance of 145 ft., or the length of each section.

In order to hold the barge assembly in place and to move it after each section was welded on, two 70-ft. anchor barges were provided with steel wire slings off their sterns to the work-barge assembly, with power winches carrying 1,700 ft. of 1⅛-in.-diameter steel wire line to 1,000-lb. anchors of a combination mushroom and plow type.

As the pipe line was laid the anchors were alternately moved ahead to keep the forward pull on the work-barge assembly and at the same time hold the assembly against the swift current which varied from 3½ to 6 miles per hour. Two 50-ft. twin-screw diesel tugboats were kept in service against the work-barge assembly as a safety factor in case one of the anchors pulled out. These tugs were also used to hold the assembly in place each time one of the anchors was moved forward.

The 9⅝-in. barrel was cut loose from the deck and lowered into the river with the 4½-in. line after the last weld was finished.

It took 55 minutes to complete each of the section welds. Most of the time was consumed in moving anchors and with delays caused by the heavy rains.

The line was filled with water and washed for 5 minutes after every other weld. A final test of 800 lb., with cold water, was placed on the line and held for 4 hours without any pressure drop.

Capacity of Refinery at Pernis Will Be Tripled

By 1953 the N.V. de Bataafsche Petroleum Mij., operating company for Royal Dutch-Shell, will have increased the refining capacity of its plant at Pernis from 1,000,000 tons annually (20,000 bbl. daily) to 3,000,000 tons annually (60,000 bbl. daily), according to a company announcement from the Hague. Pernis is on the Rhine River, 4 miles west of Rotterdam.

This increased capacity, the company stated, will necessitate the erection of various new facilities as well as the extension of auxiliary and subsidiary installations. For instance, the tank farm will be enlarged to provide for a storage capacity approximately 400,000 tons, or 2,800,000 bbl.

At least three new jetties are to be built to berth seagoing tankers and canal barges. When the plans have been carried out the refinery will cover an area of about 837 acres. Future water-cooling requirements will be approximately 20,000 cc., or about 5,292,000 gal. per hour. Electrical requirements are expected to be around 12,000,000 kw. per month.

G. Delgado, representing the Colombian Government, is shown here as he started Cantagallo crude flowing through the completed pipe line on its way to the coast

International

Extension of Bahamas Concessions Sought

Pending the study of corrected contour maps, made from data gathered in last year's airborne magnetometer survey of the Bahama Islands, most of the oil companies holding concessions there are now petitioning the Bahamian Government for a year's extension to their exploration licenses. The corrected maps are just being made available by Aero Service Corp. which conducted the survey.

Meanwhile, Standard Oil Co. (Bahamas), Ltd., a subsidiary of Standard Oil Co. (N. J.), is withdrawing some of its personnel and equipment which has been utilized in a large-scale marine gravity-meter survey. Reliable reports indicate that this company obtained "good usable results," but no immediate drilling plans have been forecast.

Anglo-Bahamian Petroleum Co., Ltd., a subsidiary of Anglo-Iranian Oil Co., Ltd., has completed its extensive marine gravity-meter surveys and reduced its personnel in the islands. Within the next few weeks that company will probably appraise its work to date and decide upon future operations.

(For a detailed story about the aerial magnetometer survey in the Bahamas, see The Oil and Gas Journal, November 8, 1947, page 38.)

French Agency Cuts Purchases, Personnel

Due to a dollar shortage, Societe Nationale de Materiel pour la Recherche et l'Exploitation (S.N. Marep), purchasing agency for French oil companies, is limiting its purchases and reducing personnel at its New York office.

F. G. Cance, manager, who succeeded Marcel Schwob, is returning to France shortly and will continue business from Paris. M. Binet will conduct shipping operations from New York and will be assisted by A. Dubos.

French Output Up

Indigenous crude-oil production in France during April increased to 4,317 tons, approximately 1,080 bbl. daily, compared with the revised March output of 4,185 tons, approximately 1,043 bbl. daily, according to the French Ministry of Industry and Commerce.

Future Exploration Costs to Rise; Drilling, Production Savings Seen

EXPLORATION for oil may become more expensive in the future but costs of drilling and producing, measured in barrels recovered, may be lowered in years to come as the result of new equipment and methods now undergoing experimentation.

This was the consensus of the industry's technical men who addressed the International Petroleum Congress.

To keep pace with demand, exploration crews have the task of discovering 10,400,000,000 bbl. of new reserves by 1951, or an average of 2,600,000,000 bbl. a year, the delegates were told by Gerald H. Westby, president of Seismograph Service Corp.

The geologist is still the chief discoverer of oil and seismic reflection is still his best method, Westby said. While many new tools have been developed in recent years which have increased the facility of earlier instruments, they have not changed the fundamental methods and there remain many attractive prospecting areas which will not respond to known exploratory methods.

During the next few years Westby envisioned a great increase in the amount of seismic work under way, pointing to large areas of the United States and other countries which have not yet been explored in this manner. The volume of this exploration will be even greater, he said, if the United States Government will not handicap it by threats to force the capitalization of geological and geophysical expenses, and if the governments of other countries will permit private enterprise to engage in the search for oil within their borders.

Currently the average cost of finding an oil field equals the cost of all drilling and producing operations thereafter conducted in that field, and since there is little prospect of reducing exploration and general expenses profits must be sought by reducing drilling and operating costs, it was declared by Dr. Russell S. Knappen of Gulf Oil Corp.

New Drilling Tool Needed

Few people realize the improvements in drilling equipment made during recent years, but in one respect our drilling equipment is extremely inefficient, Knappen said. This is the practice of applying power at the surface to spin 200,000 lb. of drill pipe in order to turn a bit 2 or 3 miles away, a method which no engineer would use in transmitting power horizontally, he declared.

This terrific waste of energy must be eliminated by some means of applying power at the bottom of the hole, Knappen asserted.

Great advances have been made in the quality of drilling muds but further improvements will be made to decrease drilling costs in the future, he said, particularly drilling fluids which will prevent corrosion and fatigue cracks which cause drill pipes to twist off.

Casing and cementing are other large items of expense which Knappen predicted would be improved in the future, suggesting light-weight cements which will not push aside soft clays, and cements of higher viscosity or lower penetrating power which will not be lost in porous formations.

In time, he said, cement may bear the entire weight of the well lining and hold the high pressures of deep wells, while the steel casing will be very thin and used only to form the shape for cement. He also raised the hope that some sort of plastic can be developed to pour down a well and spread evenly over casing and tubing and into the joints to form a continuous permanent sheath to resist corrosion.

Pumping Improvements Forecast

Similar improvements are needed in producing practices, Knappen said, again criticizing the use of a mile or more of sucker rods to transmit power from the surface to the pump. The inertia losses often require three-fourths of the power applied at the well head, and the deepest wells cannot be pumped in this manner because the rods are not strong enough to support their own weight, he declared, pointing out that essentially the industry is still using the pumping method employed on the Drake well 90 years ago.

Mentioning various experiments in eliminating sucker rods, Knappen said that by transmitting power more efficiently pumping operations will become less expensive, there will be less time lost for repairs, and the volumes of oil produced prior to abandonment will be increased.

The greatest enemy of oil production is surface tension of the oil and the capillary attraction which draws the oil into the smallest pores and holds it in the formation. He asked for some cheap chemical agent which could be injected with gas or water to break the surface tension and permit full recovery of oil in formation.

Chemicals to reduce corrosion of casing and pumping equipment might reduce operating expense by 50 or 75 per cent, Knappen said, declaring that many pumping wells are abandoned before all oil is recovered because corrosion has made continued operation too expensive.

Secondary recovery methods also will be improved, the speaker said, declaring that the time may come when the states will require unit operation of all gas-cap pools. He added, however, that in a water-drive field competition among individual operators will result in greater ultimate recovery than under unitization.

Casing Corrosion Discussed

Well casing may be protected from corrosion by cathodic methods, the Congress was told by S. P. Ewing and J. H. Bayhi for Carter Oil Co. They described a series of tests conducted in the Loudon pool in Illinois which indicate that electric current will protect casing to a depth of 1,500 to 2,000 ft. They added that further tests will be required to determine the conditions under which savings in preventing corrosion will offset the costs of installing and maintaining the cathodic protective system.

Scale traps attached to lease tanks and storage tanks in a pipe-line system handling sour crude cause great savings in pump repair and maintenance and also eliminate one of the main contributors to hydrogen sulfide corrosion, it was declared by George L. Crain of Interstate Oil Pipe Line Co., who described the construction and operation of traps on a pipe line in South Arkansas.

Offshore Drilling Described

Great prospects for future oil development lie in the Gulf of Mexico, Dean A. McGee, executive vice president of Kerr-McGee Oil Industries, Inc., told the congress.

The Continental Shelf in the Gulf, he declared, "may contain 25 per cent of United States oil reserves." Asserting that drilling now is possible in open water 150 ft. deep, McGee said that on this basis there are 30,500 square miles of potential oil-producing submerged lands.

The speaker, supplementing his talk with slides, described the methods used in drilling the successful Kerr-McGee wildcat in Block 32, 12 miles off the Texas coast, and outlined problems encountered in offshore operations.

Describing another recent innovation in the oil industry, Howard E. Felt, vice president of Warren Petroleum Corp., presented a movie showing construction of the Natalie O. Warren, first tank ship designed solely for carrying liquefied petroleum gases.

In another talk before the congress, William T. Payne, president of Big Chief Drilling Co., lauded the industry for its unceasing efforts to meet all demands for petroleum products as they arise.

House Group Kills Plan of Navy To Surrender Two Oil Reserves

WASHINGTON.—A House Armed Services subcommittee last week tabled a Navy proposal to abandon Naval Petroleum Reserves Nos. 2 and 3 because members frankly expressed unwillingness to trust the Interior Department a second time with notorious Teapot Dome.

The action halted a hearing at which Commodore William G. Greenman, director of naval petroleum reserves, had explained that neither reserve has any military value, No. 2 because two-thirds of it is privately owned and practically all of the Government lands were leased while administration of naval reserves was in the hands of the Interior Department in the '20's, and No. 3 because it is now estimated there is a reserve of only 8,000,000 bbl and a potential daily production of 2,000 bbl.

The reserve in No. 2 (Buena Vista, Calif.) is estimated at approximately 100,000,000 bbl., which is being produced at a rate in excess of 16,000,000 bbl. yearly. No. 3 (Teapot Dome, Wyo.) originally was believed to contain over 125,000,000 bbl. of recoverable oil, but development revealed its possibilities to have been grossly over-rated, although Greenman admitted no test has ever been made of the deep sands below the producing horizon now being worked.

Greenman made it clear that the department wishes merely to turn these reserves over to Interior, but is strongly opposed to inclusion of the other reserves, No. 1, Elk Hills, Calif., and No. 4, Alaska, and "is in no sense abandoning the possibility at some future date of establishing additional petroleum reserves wherever known potential oil-bearing lands are available which constitute, in fact, a substantial reserve of oil in the ground, and wherein the Navy may be able to conserve the oil and protect it from drainage by operators outside the reserved areas."

The Navy's proposal was immediately attacked by Rep. Carl Vinson of Georgia, who declared the idea was inconsistent and wanted to know why Elk Hills and Alaska shouldn't also be turned over to Interior. "Right now," he said, "it looks as though you can't find even as much oil in Point Barrow as is in Teapot Dome."

The congressman referred to the fact that California oil interests appeared to be highly interested in the proposal, and added "there must be some reason why the industry in California doesn't like Navy control."

Greenman explained that the industry's interest probably was due to the fact that some parts of Buena Vista are being over-produced and the operators are endeavoring to unitize that area. As it now stands, with the Navy administering the leases, the machinery is cumbersome whereas under Interior control unitization would be simplified.

Greenman said the Navy is paying Interior $23,000 a year for expert assistance in the administration of the leases, and the Navy simply wants to "get its house in order," but Vinson suggested that if development of Elk Hills shows there is less oil than expected the Navy might consider the next proper step would be to let that reserve go.

Newly Appointed Five-Man Oil and Gas Board Assumes Duties in Mississippi

JACKSON, Miss. — Mississippi's oil industry is now being guided by a new five-man board authorized by the 1948 State Legislature.

Under the legislative enactment, the board is composed of three members appointed by Gov. Fielding L. Wright, one appointed by Attorney General Greek L. Rice, and one appointed by Lieut. Gov. Sam Lumpkin.

H. M. MORSE

Named by the governor were Former Gov. Hugh L. White of Columbia, a lumberman; W. C. Leonard, Kosciusko, merchant; and James McClure, Sardis, attorney. The attorney general named William (Billy) Maynard, Clarksdale attorney and former assistant attorney general, and the lieutenant governor named Walter G. Johnson, Jr., Jackson publisher.

At the board's organization meeting McClure was selected chairman, and Leonard was named vice chairman. H. M. (Don) Morse, of Jackson, who had served as supervisor of the old board since its organization in 1938, was re-named as supervisor-secretary of the new board. The new board replaces the old set-up under which the board was made up of the governor, attorney general, land commissioner, and supervisor.

Under Mississippi's new oil and gas conservation act, funds for administration of the law and operation of the board will be derived from an assessment of 2 mills on each barrel of oil and 0.1 mill on each 1,000 cu. ft. of natural gas produced in the state.

Gov. Fielding L. Wright of Mississippi (left) is shown administering the oath of office to the state's new oil and gas board members. Members of the board, reading left from Governor Wright, are as follows: Former Gov. Hugh L. White, Columbia; W. C. Leonard, Kosciusko, vice chairman; James McClure, Sardis, chairman; Walter G. Johnson, Jr., Jackson; and William (Billy) Maynard, Clarksdale

Pioneers of Petroleum named at I.P.E. Left: Frank Haskell of Tide Water Associated Oil Co., named Pioneer of Pioneers for 69 years of service. Right: Participating in the Pioneers ceremony were W. L. Connelly, chairman of the Pioneers in Petroleum committee; Mrs. Frank Wood, daughter of Frank Haskell who received the award for her father; Dana H. Kelsey, Pioneer in land, lease, and legal activities; B. E. Hull, Pioneer in pipe lines; and Herbert Straight, Pioneer in production

300,000 Visitors Throng I. P. E.; Pioneers of Industry Honored

by Henry D. Ralph

VISUAL evidence that the oil industry has the equipment, the science, and the vigor to find and deliver the petroleum to meet the world's requirements—that was the impression made on visitors at the International Petroleum Exposition which closed its gates May 22 after an 8-day run.

From every point of view the oil show was hailed as a success. Turnstiles clocked a total of 301,307 admissions, including many repeaters and many sight-seers but also a satisfying percentage of operating oil men shopping for new equipment. Highest attendance in one day was 43,834 on Thursday. The highest total of any previous exposition was 226,427 in 1938.

A poll of 20 I.P.E. directors and 20 large and small exhibitors produced an estimate that the exposition will be responsible for sales of equipment and services totaling $1,000,000,000 consumated on the grounds or following within 6 months as a result of the contacts made at the show.

Smaller companies particularly were enthusiastic over this method of displaying their wares and meeting potential customers. Decision as to whether the next exposition will be held in 1950 or 3 or 4 years hence will be made by the I.P.E. directors late in the summer after a canvass of exhibitors.

Honors for "stealing the show" could be divided between the Hall of Science and the display of motorized equipment and portable rigs.

As a homecoming and reunion for oil men the exposition was an equally big success. More than 600 foreign delegates and American oil men operating abroad registered during the 8 days.

The International Petroleum Congress brought speakers of national and international prominence to describe latest techniques in the industry, forecast future trends, and expound the policies of their countries in petroleum development. Some 450 requests for a transcript of the Congress proceedings already have been received from many parts of the world, and as soon as it is printed copies will be sent to all requesting it of the International Petroleum Exposition at Post Office Box 978, Tulsa.

"Old Timers" also flocked to the show, and more than 600 men with more than 25 years' service in the industry registered and received silver "Pioneer" buttons. Similar buttons will be mailed to others who send in evidence of a quarter-century of active service.

Selected for special honor were eight men nominated as having the greatest length of service and contributing the most in their branches of the industry.

Old Timers Honored

The award of "Pioneer of Pioneers" was given to Frank A. Haskell, of Sharon, Conn., retired vice president and still a director of Tide Water Associated Oil Co. He has spent 69 years in the oil industry, starting at the fabulous "Pit Hole" in Pennsylvania where his father was an oil operator during the boom of the '70's, then coming to Oklahoma in 1911 as head of the old Oklahoma Oil Co., which later was absorbed by Tide Water Associated.

Named as Pioneer in Refining was Charles L. Suhr, Oil City, Pa., chairman of the board of Pennzoil Co. He has had 56 years of service with that firm and its predecessors, and has long been active in oil association work.

Pioneer in Pipe Lines is B. E. Hull, Houston, president of Trans-Arabian Pipe Line Co., vice president of The Texas Co., director of five other pipeline companies, and a veteran of 45 years in this branch of the industry.

Ralph W. Gallagher, New York, retired board chairman of Standard Oil Co. (N. J.), was named Pioneer in Natural Gas for his 50 years in the industry, starting in a pumping station and going up through the natural gas and other departments of Standard.

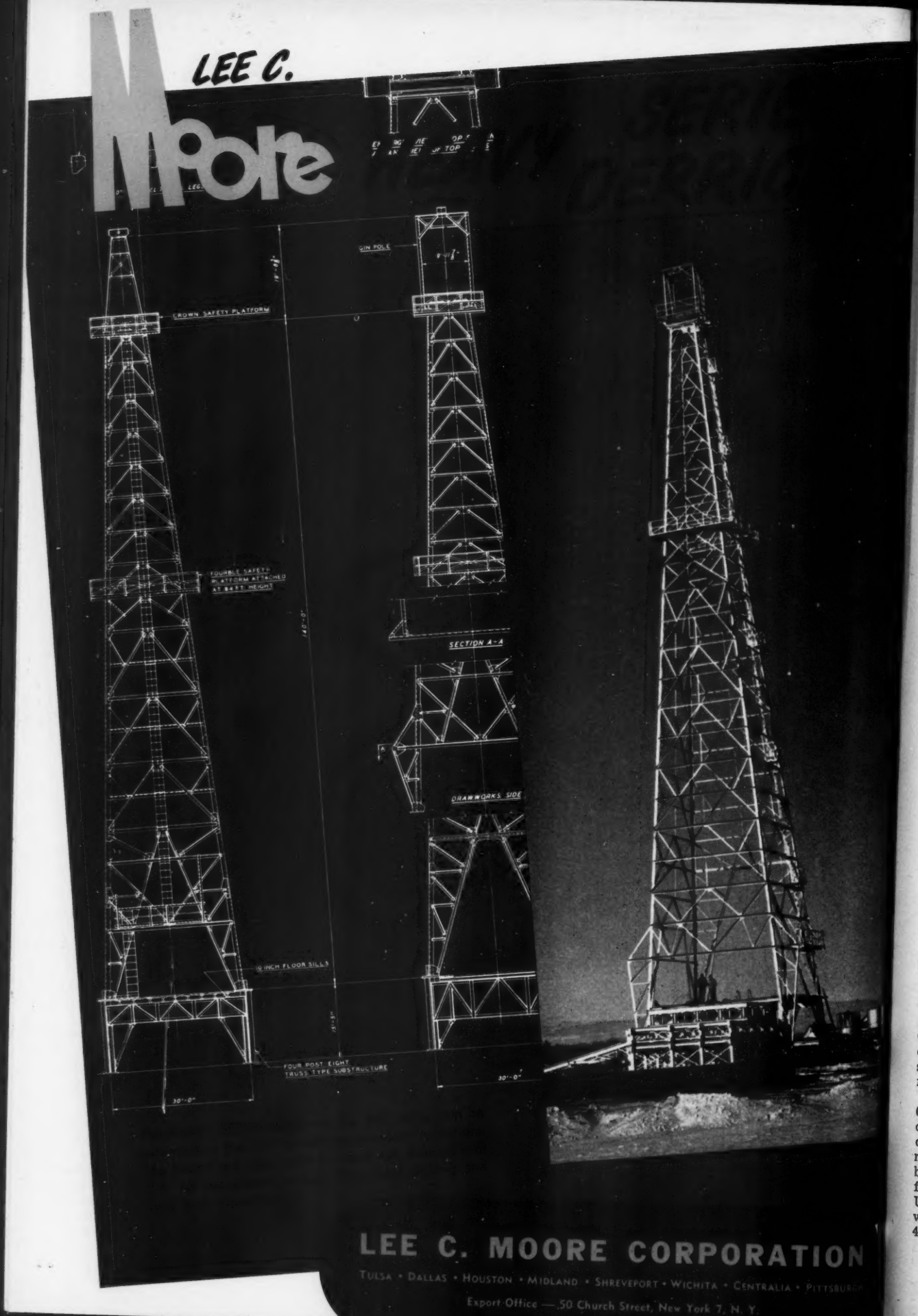
The award of Pioneer in Land, Lease and Legal service went to Dana H. Kelsey, Tulsa, vice president of Sinclair Prairie Oil Co., for 43 years of service which began in Oklahoma during Indian Territory days.

George W. Bovaird, Bradford, Pa., was named Pioneer in Supplies and Equipment, having had 54 years in this work.

Herbert Straight, Bartlesville, was named Pioneer in Production. Now chairman of the board of Cities Service Oil Co., he has spent 51 years in the production end of the oil business.

"Grand Old Man of Oklahoma" was the title bestowed on Frank Phillips of Bartlesville, chairman of the board of Phillips Petroleum Co., who came to Indian Territory to engage in banking but spent the last 45 years in the oil business.

Nominations for the Pioneer awards came from all over the nation, and selection was made by a special committee headed by W. L. Connelly, chairman of the board of Sinclair Prairie Oil Co. Connelly and another member of this committee, James A. Veasey, retired general counsel of Carter Oil Co., spoke at a ceremony on the exposition grounds Friday afternoon at which award medals were presented to those Pioneers present and to relatives and friends of those unable to attend.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WASHINGTON WATCHING

BY BERTRAM F. LINZ

Last-Minute Rush

WASHINGTON.—Congress is running into the greatest session-end legislative log jam in many years, and failure to deal with it effectively may prolong the session, each additional day of which would carry the danger that some vote-hungry member might take advantage of the opportunity to stir up the "oil issue."

Because the Republican national convention opens June 21, efforts are aimed at final adjournment by June 19, but if the many measures which still must be dealt with are not disposed of by that date, Congress might recess until that convention closed, then come back for a week or 10 days before the opening of the Democratic convention July 12. And if debate on the controversial issues which are pending is unduly extended, it might be necessary for members again to return to Washington after a brief vacation.

Republican leaders are tossing overboard everything of less than major importance, but new legislation is coming out of committees at an abnormal rate.

The determination to skeletonize the schedule has resulted in the elimination of practically all oil legislation, including the Wolverton bill for synthetic fuels, and the proposal for a joint House-Senate committee to investigate and develop a national oil policy.

But there are still about a dozen appropriations bills, including those for the Interior Department and European recovery, to be passed, as well as legislation dealing with the draft and compulsory military service, civil rights, housing, federal aid to education, and displaced persons, which are on the "must" list.

Old Story Revived

ANOTHER chapter in the vivid history of Teapot Dome was written last week when Rep. Carl Vinson of Georgia, recalling the scandal of a quarter-century ago, refused to consent to return of the Navy's No. 3 reserve to the Interior Department.

As a result, the reserve, in which 62 wells once were drilled to produce an estimated 125 million barrels of oil reserves now figured at no more than 8 to 10 million barrels, will be left in shut-down condition except for three wells producing from the Upper Shale and outside the reserve, which had an output last year of 4,644 bbl.

Teapot Dome was set aside by President Wilson in April, 1915, being carved out of lands originally withdrawn by President Taft in 1909. Twenty-seven years ago this month, President Harding issued an executive order transferring the naval petroleum reserves to the Interior Department, and 10 months later Interior Secretary Albert S. Fall leased the reserve in its entirety to Harry F. Sinclair's Mammoth Oil Co., setting the stage for a dramatic investigation by Sen. Thomas J. Walsh of Montana, involving figures high in official and petroleum circles, and a "little black bag" containing $100,000 in cash.

The investigation resulted in long-drawn-out court fights and took Fall and Secretary of the Navy Edwin Denby out of the Cabinet, and was the first of a series of lurid activities by Harding's most trusted associates, exposing the greatest corruption uncovered in 50 years.

As a result of the investigation, the Government sued to cancel the Mammoth Oil Co. lease, and after 3 years of litigation the Supreme Court held it invalid. Within 2 months of the final decision, production from the reserve was suspended and since January 8, 1927, it has been in a caretaker status.

Only 3,000 of the more than 9,000 acres constituting the reserve were found to be productive, and those only in the Upper Shale and 2d Wall Creek zones. During the period of its operation 3,543,282 bbl. of oil was produced.

Gas Industry Growth

THE Federal Power Commission granted 132 certificates for the construction of natural-gas facilities to cost $271,500,000 during the fiscal year ended June 30, last. That was 2½ times as many certificates and more than double the cost of facilities authorized in the preceding year.

The significant point about these figures is the tremendous increase in the size of the individual undertakings for which FPC authority is being asked.

During the fiscal year 1945, for example, 53 applications were filed for new facilities to cost $164,100,000, and during that year 43 certificates were issued which involved an estimated expenditure of $34,100,000. In contrast, the commission last October had 66 applications pending for proposed facilities which would cost more than $650,000,000.

Not so long ago, commission personnel was excited when an application involving as much as $20,000,000 was filed. Today, applications in excess of $50,000,000 create no stir, and several of that magnitude have been granted in the past year.

As natural-gas service is extended to major industrial centers more remote from producing areas, the cost of new systems is expected to continue to increase, and commission officials expect that applications will be filed at a high level for a number of years—particularly if natural gas is given a more favorable "climate" and more favorable price, as contemplated under the Rizley-Moore bill to amend the Natural Gas Act.

"No" to NSRB

AN ambitious plan whereby the National Security Resources Board would take over the administration of any antiinflation controls that President Truman might win from Congress is reported to have been turned down by the White House.

The plan is said to have been developed by Ferdinand Eberstadt, New York banker who was a War Production Board official during the war, recently brought in as a consultant to Chairman Arthur M. Hill.

The idea was that if Congress did give the President the "if and when needed" authority to ration oil or other commodities, freeze prices, and control materials, it would be delegated to the NSRB. Such a delegation would make the board just about the biggest factor in the Government, with the power to direct industry in such a way as to implement the policies for industrial mobilization in time of war which it was created last year to develop.

The NSRB is composed of the secretaries of the Treasury, Defense, Interior, Agriculture, Commerce and Labor. Interior Secretary J. A. Krug has appeared before congressional committees more than once this year to urge the granting to him of rationing and price control authority over oil.

Board officials have stressed the fact that their job is to advise the President what is needed for an effective mobilization of industry in the event of an emergency. But that mandate is pretty broad, and includes the duty of recommending steps to be taken to insure that in the event of an emergency at any time the United States is prepared. Even beyond that, the board is in a position to "suggest" to other agencies, such as the Interior Department, what might be done to strengthen our de-

fense position, such as the development of synthetic liquid fuels, acquisition of underwater oil reserves, and so on.

A recent reorganization of the board has set up a new plans and programs division which will be responsible, among other things, "for the assembly, screening, and consolidation of military and civilian requirements for manpower, materials, fuels, power, transportation, end items, end products, components, production, and equipment."

It also would have the duty of assembling and consolidating estimates of available resources, comparing requirements and resources and measuring deficiencies, and recommending methods for overcoming deficiencies "including methods of increasing resources and advice as to the cut-back of programs in line with available resources."

The suggestion that the board become a "peacetime WPB" is right in line with its policies and activities. Its rejection by the President is reported to have been based on the advice of the Commerce Department and the Bureau of the Budget that the board's program was too ambitious, as well as expressions of fear that the board is dominated by the military.

Petroleum Electric Men Meet in Dallas Next Week

Micro waves, energy sources, and facsimile transmission are among the subjects on the program of the 20th annual conference of the Petroleum Industry Electrical Association in Hotel Adolphus, Dallas, June 1, 2, and 3.

Simultaneously there will be meetings of the Petroleum Electric Supply Association and the Petroleum Electric Power Association. Each group will have separate business meetings but will join in the program of discussions and in the annual banquet June 2 at which T. E. Swigart, president of Shell Pipe Line Corp., will speak on trends in modern pipeline practices.

Addresses scheduled for June 2 include "Communications by Micro Radio Waves," by Dr. J. O. Perrine, assistant vice president of American Telephone and Telegraph Co.; "Energy Sources," by C. A. Powel, assistant vice president of Westinghouse Electric Corp.; "Southwestern Power Supply," by W. W. Lynch, vice president of Texas Power & Light Co.; "Insulation Design," by G. L. Oscarson, chief engineer of Electric Machinery Manufacturing Co.; and "New Plan Reperforator Switching," by C. E. Davies, assistant vice president, Western Union Telegraph Co.

The program for June 3 includes "Electric Power Generation With Gas Turbines," by Cecil Jordan, sales manager of Allis-Chalmers Co.; "Industry Meets Facsimile," by Kenneth A. Regel, sales manager of Automatic Electric Sales Corp.; "New Equipment for the Petroleum Industry," by T. R. Rhea, manager of the chemical and petroleum division of General Electric Co.; "Hydrocarbons in Industry," by G. R. Walton, industrial engineer of United Gas Pipe Line Co.; "Report on A.P.I. Committee on Radio," by F. W. Littell, superintendent of telegraph and telephone department of Shell Pipe Line Co.; and "Frequency Allocations for the Petroleum Industry," by J. H. Wofford, communications consulting engineer.

S. L. Digby New Head of Louisiana Conservation

BATON ROUGE.—S. L. Digby, Monroe, La., attorney, has taken office as new head of the Louisiana Conservation Department succeeding Joseph L. McHugh, conservation commissioner since 1941.

Digby's experience in the oil industry is in the legal phases. His Monroe law firm, Oliver & Digby, has long handled considerable work in oil and gas matters. Digby was born near Bernice, La., on a farm. He attended high school there and received a law degree from Louisiana State University in 1916. Following service in World War I, he entered law practice at Farmersville, was appointed Union-Lincoln district attorney, was later elected to that post, and subsequently district judge.

Navy to Sink 250 Wells in Elk Hills

WASHINGTON. — The Navy Department has decided to follow one of the recommendations contained in the recent report of the House Armed Services oil subcommittee and go full speed ahead on a $30,000,000 3-year development of the Elk Hills naval reserve.

Accepting the industry's contention that the only adequate war reserve is one which is developed to the point where it can produce in volume immediately, the Navy plans to sink 175 wells in the shallow zone of the Elk Hills reserve, completing its development, and put 75 wells into the Stevens zone where, so far, only 16 have been drilled.

Pipe-Line Contractors Receive Charter

THE Pipe Line Contractors Association became the Mid-Continent Pipe Line Chapter of The Associated General Contractors of America at a charter presentation ceremony in Tulsa, May 22.

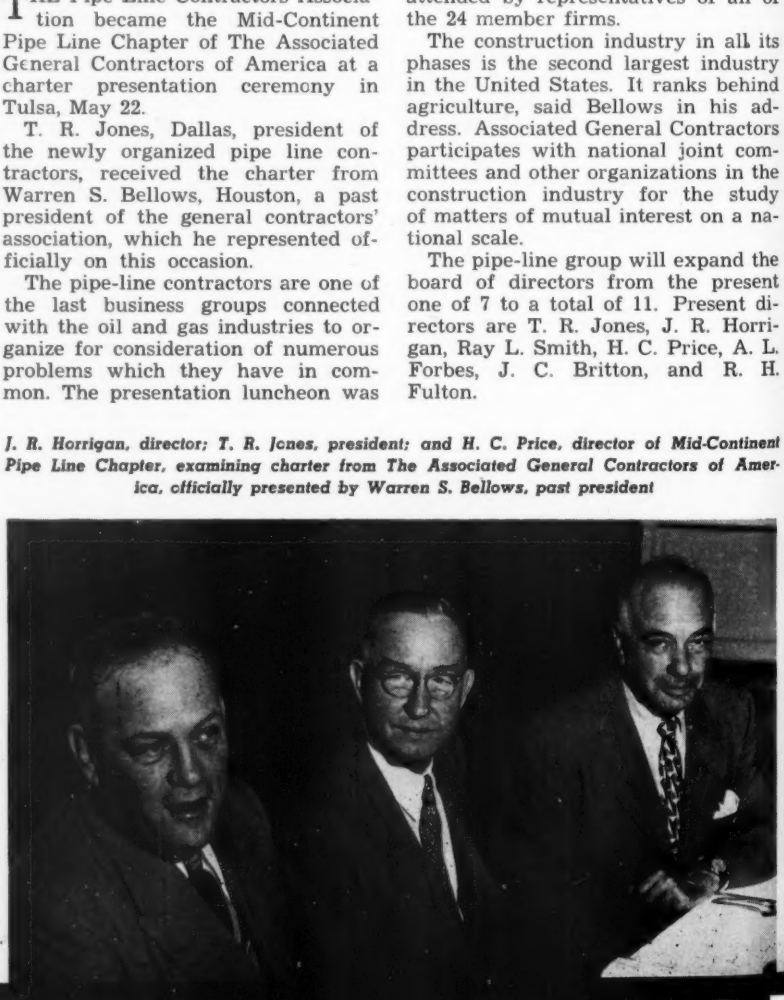
T. R. Jones, Dallas, president of the newly organized pipe line contractors, received the charter from Warren S. Bellows, Houston, a past president of the general contractors' association, which he represented officially on this occasion.

The pipe-line contractors are one of the last business groups connected with the oil and gas industries to organize for consideration of numerous problems which they have in common. The presentation luncheon was attended by representatives of all of the 24 member firms.

The construction industry in all its phases is the second largest industry in the United States. It ranks behind agriculture, said Bellows in his address. Associated General Contractors participates with national joint committees and other organizations in the construction industry for the study of matters of mutual interest on a national scale.

The pipe-line group will expand the board of directors from the present one of 7 to a total of 11. Present directors are T. R. Jones, J. R. Horrigan, Ray L. Smith, H. C. Price, A. L. Forbes, J. C. Britton, and R. H. Fulton.

J. R. Horrigan, director; T. R. Jones, president; and H. C. Price, director of Mid-Continent Pipe Line Chapter, examining charter from The Associated General Contractors of America, officially presented by Warren S. Bellows, past president



PERSONALS

Former Draftsman Now In High Texaco Post

A E. WILLIG has been named to fill a newly created position of superintendent of gas and gasoline plants in the West Texas division of the producing department of The Texas Co.

Willig, whose appointment was announced by C. B. Williams, manager of the West Texas division, formerly was division engineer in West Texas. In his new job, he will have supervision of all gas operations in a widespread area consisting of West Texas, North Texas, the Panhandle, and New Mexico. His headquarters will be in Fort Worth.

Born in Temple, Tex., he attended school there. Following service in World War I, he attended Rice Institute in Houston in 1919 and 1920.

Willig was employed by The Texas Co. as a draftsman in the producing department in Houston May 25, 1921, and has been with the company ever since. Following assignments at Shreveport and Parks, he was transferred to Cisco, Tex., as division engineer of the old North Central Texas division of the company.

In 1933, he was promoted to division engineer of the West Texas division and has been in Fort Worth since that time.

W. W. Newton, president of Geotechnical Corp., has been elected president of the Dallas Geophysical Society; **K. E. Burg,** Geophysical Service, Inc., first vice president; **D. Ray Dobyns,** Magnolia Petroleum Co., second vice president; and **W. G. Smiley,** Sun Oil Co., secretary-treasurer. **A. E. McKay,** Atlantic Refining Co., past president of the society, and **Paul E. Nash,** Magnolia Petroleum Co., have been elected district representatives of the Society of Exploration Geophysicists.

Harold W. Manley, recently appointed manager of production in the Mid-Continent division of Barnsdall Oil Co., was elected vice president of the company at a meeting of directors May 24. A picture and biographical sketch of Manley appeared in the Journal March 4, page 58.

Edward Sampson, formerly associated with Pure Oil Co. and later plant superintendent for 10 years with Velsicol Corp., at Marshall, Ill., has joined the William G. Madlener Petroleum interests in Buenos Aires as consultant.

L. K. Lancaster, with Seaboard Oil Co. of Delaware, has been named to act as geologist coordinator between the Seaboard's district geological offices in Midland and Abilene and the company's southwestern headquarters in Dallas.

Eric H. Jager, of the geological department of Stanolind Oil & Gas Co. at Wichita, has resigned to join the newly organized Petroleum, Inc., of which **Willard Garvey** is president.

FRED POWELL

Fred Powell, president of California Refining Co., Standard Oil Co. of California subsidiary, has been made general manager of the El Segundo refinery to succeed **W. W. Davison,** recently named a vice president of Standard. Powell graduated from the University of Washington in 1922 as chemical engineer and joined Standard in 1925 at the Richmond refinery. In 1938 he was made assistant to the superintendent of the Bakersfield refinery, in 1941 assistant superintendent of the El Segundo refinery, and then manager of the refining division there.

Thomas F. Hitchell, Jr., analyst in the Bayonne, N. J., chemical laboratory for the past 11 years for Esso Standard Oil Co., was recently appointed supervisor in charge of the chemical laboratory group at Constable Hook. He succeeds **Thomas B. Frystock,** who has resigned.

J. A. Lentz, western sales manager of Continental Oil Co., Denver, and **W. N. Finnegan, Jr.,** assistant to the president of Humble Oil & Refining Co., Houston, have been elected to the Oil Industry Information Committee.

Robert H. Lynch, manager of operations for Keystone Pipe Line Co. and Buffalo Pipe Line Corp., has been named vice president of the two companies. He joined Atlantic Refining Co. in 1929 and transferred to Keystone Pipe Line Co. in 1932. During the war he served with War Emergency Pipelines as assistant to the vice president in charge of operations.

STANLEY C. HOPE

Stanley C. Hope, formerly president of Gilbert & Barker Manufacturing Co. and Stanco, Inc., affiliate of Standard Oil Co. (N.J.), has been elected executive vice president and director of Esso Standard Oil Co. Hope started with Gilbert & Barker, manufacturers of oil burners and gasoline pumps, and has held positions as New York and European sales manager. In 1927 he became vice president of the company and in 1932 president. He succeeds **A. Clarke Bedford,** who in his 35-year career with the company and affiliates has been active in production, manufacturing, and marketing operations. Among his previous positions are those of secretary and assistant treasurer of Carter Oil Co., vice president and director of Standard of Louisiana, and president of Colonial Beacon Oil Co.

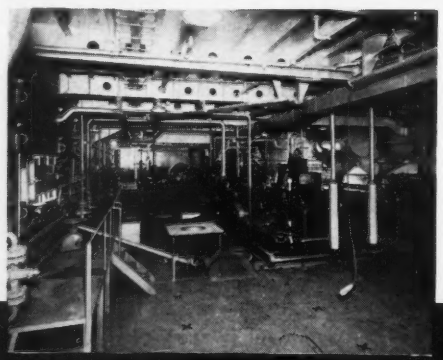
H. H. Maddren, vice president of Republic Petroleum Co., has been elected president of the company to succeed **C. C. Spicer,** who is retiring. **Raymond A. Earle** has been named vice president to succeed Maddren.

William K. Whiteford, president of British American Oil Co., Ltd., Toronto, Ont., and British American Oil Producing Co., Tulsa, recently was elected a director of the Bank of Nova Scotia, one of the 11 national chartered banks in Canada.

Warren K. Venatta, group supervisor in charge of gasoline synthesis in the El Segundo laboratories of California Research Corp., has been named manager of product control for Oronite Chemical Co., a subsidiary of

Leevingston

1st TO CONVERT AN "LST" INTO A NON-SELF-PROPELLED OIL WELL DRILLING TENDER

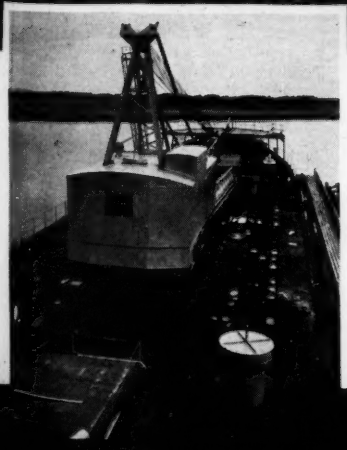


Six of these 10,000 lb. Danforth anchors will be used in mooring the "S-23" at platform location. These anchors, 11 ft. in length, are the largest ever made.

XUM

Levingston

1st TO CONVERT AN "LST" INTO A SELF-PROPELLED OIL WELL DRILLING TENDER



Levingston—pioneer of numerous innovations in submersible drill barges, is again first with the finest . . . the most quality for the least cost . . . in distant off-shore drilling tenders. The self-propelled "R. W. McIlvain", above, a converted Type "LST" naval vessel, was completed last year for the Pure Oil Co. It is equipped for pile driving work in deep water. The "S-23", opposite page, first of two "LST's" converted into sea-going oil well drilling tenders, was delivered recently to the California Company. This conversion was made in the record time of 75 work days.

Operators planning off-shore tests are invited to investigate the sound engineering and economy of Levingston—headquarters for marine drilling equipment.

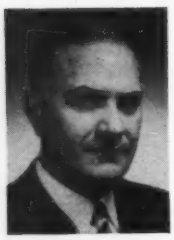
Levingston

XUM

PERSONALS

Standard Oil Co. of California. His new position will be to coordinate production availability with requirements.

William C. Feazel, independent oil and gas operator of Monroe and Shreveport, La., has been named United States Senator from Louisiana to succeed the late John H. Overton.



Clarence F. Hansen, formerly president of American Gilsonit Co., an affiliate of Standard Oil Co. of California, and at one time chief engineer of Standard's manufacturing department, has been elected president of the recently organized Calmara Oil Co. The new firm has been set up to transport and sell crude oil from Venezuela. It is a wholly-owned subsidiary of Richmond Exploration Co., which in turn is a Standard of California subsidiary.

Wilson Metcalf, representative of crude-oil purchases and sales, The Texas Co., Tulsa, was elected general chairman of the standing committee on oil-field nomenclature of the Kansas-Oklahoma division, Mid-Continent Oil and Gas Association to succeed William R. Thawley, who died recently. **P. M. Broach,** in charge of sales and exchanges, Stanolind Oil Purchasing Co., Tulsa, was elected general vice chairman. **Sam Baird,** chief scout, Mid-Continent Petroleum Corp., was named chairman of the Oklahoma steering committee of the association.

W. A. Alexander, manager of Tulsa area of Shell Oil Co., Inc., was host May 24 at the Tulsa Club to **H. S. M. Burns,** president of the company, New York City, and **E. D. Cumming,** regional vice president, Houston. Burns and Cumming headed a large delegation of Shell managers and employes attending the International Petroleum Exposition.

Harley R. Hinton, one of the founders of North Central Texas Oil Co., Inc., in 1919 and a director of the company since that time, resigned recently as director. Hinton was president of the company from 1920 to 1929. **John P. Wemple,** who has been connected with the Shreveport office of North Central Texas Oil Co., Inc., since 1925, has been elected a vice president and a director of the company. **James A. Rush,** who has been with the New York office of the company since 1941, has been elected an assistant treasurer.

Dr. A. B. Bryan, chief geophysicist for Carter Oil Co., Tulsa, has been elected president of the Geophysical Society of Tulsa.

R. W. Miller and **I. R. Cunningham** have been elected to the board of directors of Creole Petroleum Corp. Miller, who was recently elected a vice president, is in charge of export sales of crude oil and products. He also coordinates all crude-oil purchases and exchanges. Cunningham was appointed comptroller last August and has been associated with Creole since 1924. Miller has been with Creole and other Standard Oil Co. (N. J.) interests since 1919.

W. H. Kolins, formerly with Pine Bluff Chemical Co., has been named superintendent of production for Frontier Chemical Co. He will supervise the manufacture of caustic soda and muriatic acid at Frontier's electrochemical plant at Denver City, Tex.

Harry M. Buchner, geophysical-geological coordinator for Carter Oil Co., was elected president of the Ark-La-Tex Geophysical Society at a recent meeting of the organization in Shreveport. He succeeds **George E. Wagoner,** also of Carter, and the first president of the society. Other officers elected include: **L. F. Fischer,** chief geophysicist for the Shreveport district of Sohio Petroleum Co., vice president, to succeed **R. M. Wilson** of Ohio Oil Co.; and **Carl L. Bryan,** chief geophysicist of Shreveport district for Gulf Refining Co., secretary-treasurer, to succeed **J. R. Walker,** Arkansas Fuel Oil Co.

B. I. Graves, executive vice president of Tide Water Associated Oil Co., has been named chairman of the Petroleum Industry Advisory Committee of the Oil and Gas Division, Department of the Interior.

C. W. Witt, formerly with the geological department of The Texas Co. in Oklahoma and Illinois, has joined Shawver - Graham, Inc., Wichita, Kans., to be in charge of the geological branch of the company.

Stanley A. Bloch, formerly petroleum engineer with The Texas Co., Fort Worth, has joined the Haynesville Operating Committee, Haynesville, La., as chief petroleum engineer.

E. W. Cook, formerly a senior landman in the Oklahoma City district office of Stanolind Oil & Gas Co., has been appointed district landman for the North Louisiana - Arkansas district with headquarters at Shreveport, La. **G. L. Ellis,** formerly a seismograph interpreter in Houston division office, has been made party chief at Anadarko, Okla. and **G. N. Meade,** formerly assistant party chief of a marine seismograph party working out of Houston, has been made party chief for a new Stanolind party at Rock Springs, Wyo.

Five former Hollanders who have worked together in various parts of the world held an impromptu reunion in the International House of the Nomads during the International Petroleum Exposition in Tulsa. They are, left to right, A. J. deJager, Bataafsche Petroleum Maatschappij, Batavia, N.E.I.; John Arps, British-American Oil Producing Co., Tulsa; J. C. B. Vandenberg, Nederlandsche Pacific Petroleum, My., (American Overseas Petroleum Co.), San Francisco; Maarten Verheul, Oilfield Machine & Supply Co., Houston; and Al Pranger, Guiberson Corp., Dallas

FRED CLEMENT

Fred M. Clement, division petroleum engineer at Casper, Wyo., for the Montana-Wyoming division of Continental Oil Co., has been promoted to region petroleum engineer with headquarters at Denver. Clement is a 1932 petroleum engineering graduate of Texas A. & M. College. **G. H. Orr,** formerly district petroleum engineer for Montana at Gebo, Wyo., has been named to succeed Clement, and Orr will be replaced by **W. C. Blackburn,** formerly petroleum engineer at Gebo.

T. BROWNFIELD

Thomas Brownfield, manager of the economics department and coordinator of manufacturing and marketing for Carter Oil Co., Tulsa, has been named a director of the company. He began work in the oil-runs department for Carter in 1927, became chief scout in 1935, and remained in that position until 1941. He was then named an executive assistant in the producing department of Standard Oil Co. (N. J.), with headquarters in New York. **C. G. Herrington,** assistant manager of the production department for Carter, has been named manager of that department. He joined Carter after receiving his engineering degree from Oklahoma A. & M. College in 1934. He did engineering work in Crescent and Lucien fields in Oklahoma, later was stationed in Ponca City, and in 1938 went to Mattoon, Ill., as assistant division engineer. He served as Carter's central division engineer at Seminole, Okla., and then returned to the Eastern division at Mattoon in 1946 as division superintendent. **A. R. West** has been named to succeed Herrington as assistant manager of the production department. Other recent changes in the Carter company include **Dr. J. J. Mullane,** assistant to the president, transferred to New York to serve on the staff of **John W. Brice,** coordinator of production for Standard Oil Co. (N. J.), and **D. W. Cameron,** formerly Carter chief scout, who has been named assistant to the president to succeed Mullane.

SHIFTS—

J. L. Woods, engineer, Magnolia Pipe Line Co., Alvord to De Leon, Tex.; **M. E. Bass,** foreman, Continental Oil Co., Henrietta to Decatur, Tex.; **C. L. Briggs,** foreman, Continental Oil Co., Liberal, Kans., to Riverton, Wyo.; **E. L. Wells,** foreman, Continental Oil Co., Madill to Guthrie, Okla.; **Albert Trammell,** engineer, Texas-New Mexico Pipe Line Co., Wimberly to Katy, Tex.; **V. L. Maddex,** foreman, Standard Oil Co. of Indiana, Beaumont to Mexia, Tex.

John S. Goodrich, engineer, Magnolia Petroleum Co., Brownfield to Kermit, Tex.; **Glenn Trimble,** engineer, Magnolia Petroleum Co., Brownfield, Tex., to Chickasha, Okla.; **J. R. Wright,** superintendent, Magnolia Pipe Line Co., Brownfield to Beaumont, Tex.; **J. D. Pigman,** foreman, Shell Pipe Line Corp., Crane to Hamlin, Tex.; **E. H. Shannon,** foreman, The Texas Co., Houston, Tex., to New Orleans, La.

W. B. Palmer, Jr., engineer, Superior Oil Co., Magnolia to Conroe, Tex.; **A. J. Carroll,** engineer, Stanolind Oil & Gas Co., Pampa to Greggton, Tex.; **C. E. Rawlins,** engineer, Phillips Petroleum Co., Phillips, Tex., to Bartlesville, Okla.; **Charles A. Schwartz,** engineer, Caska Corp., Quitman to Tyler, Tex.; **Arnold Hegwer,** superintendent, McCarthy Chemical Co., Winnie to Bellaire, Tex.; **Earl Reeves,** foreman, Union Sulphur Co., Inc., Church Point to Eunice, La.

J. B. Hamilton, superintendent, Sun Oil Co., Delhi, La., to Midland, Tex.; **Billy D. Low,** engineer, Carter Oil Co., Jonesville, La., to McAlester, Okla.; **M. B. Willey,** engineer, J. Ray McDermott & Co., Inc., Harvey to New Orleans, La.; **Rex M. Smith,** geologist, Humble Oil & Refining Co., Fort Myers to Everglades, Fla.; **Bernard B. Spaulding,** geologist, The Texas Co., Tallahassee, Fla., to New Orleans, La.

Millard R. Wilson, engineer, The Texas Co., Salem, Ill., to Marlow, Okla.; **William H. Roe,** engineer, Superior Oil Co., Newaygo, Mich., to Crossville, Ill.; **Hugh Porter, Jr.,** foreman, Seismic Explorations, Inc., Crystal Springs to Poplarville, Miss.; **Clark M. Shimeall,** geologist, Ohio Oil Co., Durango, Colo., to Kanab, Utah; **Frederick F. Dueser,** engineer, Republic Natural Gas Co., Golden, Colo., to Ellinwood, Kans.

Jack Gallivan, superintendent, Wood River Oil & Refining Co., Inc., Great Bend, Kans., to Lusk, Wyo.; **J. F. Everett,** foreman, Magnolia Petroleum Co., Burbank to Chandler, Okla.; **B. G. Hubner,** engineer, Atlantic Refining Co., Comanche, Okla., to Midland, Tex.; **V. D. Miller,** superintendent, Noble Drilling Corp., Chickasha to Tulsa; **G. L. Hawkins,** superintendent, Skelly Oil Co., Guymon to Seminole, Okla.; **Clyde Burton,** foreman, Skelly Oil Co., Seminole, Okla., to Kermit, Tex.

DEATHS

Frank E. Richart, 74, of Wellsville, N. Y., Allegany County oil producer and past director of the Pennsylvania Grade Crude Oil Association, died May 14 in Wellsville. Richart was one of the organizers and treasurer of Ebenezar Oil Co. and a founder of New York State Oil Producers Association.

Raymond Thomas McNally, 48, district superintendent for Shell Oil Co., Inc., died May 22 in Arkansas City, Kans. A native of Warren, Pa., he went to Oklahoma as an employe of Sinclair Oil Co. and later became associated with Tydol Oil Co. He joined Shell in 1927.

Carl M. Anderson, 50, Oil City, Pa., oil operator and coordinator of engineering development for International Derrick & Equipment Co., a division of Dresser Industries, Inc., died May 22 in Cleveland, Ohio.

D. M. Bladstock, 64, superintendent for Atlantic Pipe Line Co. in the Refugio, Tex., district, died May 16 in Refugio. Bladstock had been with Atlantic Pipe Line more than 25 years.

Dr. Charles E. Allen, Jr., 43, director of medical services for Esso Standard Oil Co. in Baton Rouge, La., died May 17 in Baton Rouge.

Robert Lee Davis, 44, a superintendent for Shell Chemical Co. in Houston, died May 19 in Houston.

Moses Jerome Brundage, 79, retired fieldman for Skelly Oil Co. at Ardmore, Okla., died May 17 in Memphis, Tenn.

Herbert Milton Ash, 58, a partner and manager of Crown Drilling Co., died May 17 in Wichita, Kans. Ash was drilling superintendent for E. B. Shawver, independent operator of Wichita, for 16 years.

A. E. Parmalee, 59, a chemist for E. I. du Pont de Nemours & Co. and known for research on tetraethyl lead, died May 14 in Wilmington, Del. He had been with du Pont since 1916.

Allowable Transfer FROM HIGH WATER WELLS LEVELS EAST TEXAS

Water Withdrawal Rate

by George Weber

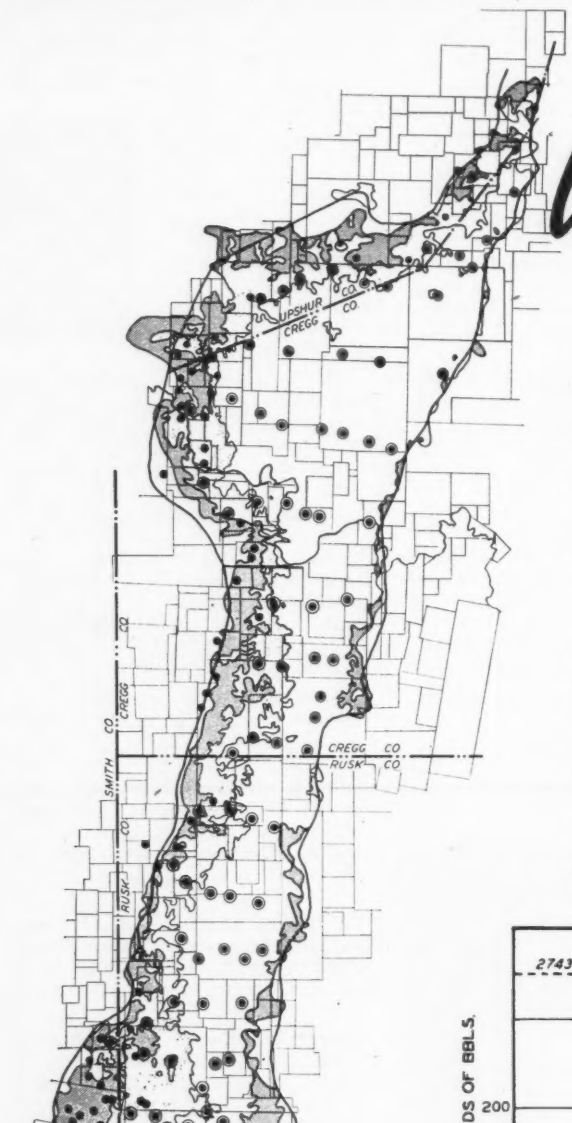


Fig. 1 — (Left) East Texas field, showing original limits of commercial production, areas abandoned, and areas in which water is produced with oil. About 76 injection wells are currently in use

Fig. 3 — (Below) A breakdown of East Texas wells as of January 1, 1948, shows that of the total of 5,375 wells making water, those making 100 bbl. or more daily, account for nearly 90 per cent of salt water production

THE shutdown of over 200 high-water-oil-ratio wells in East Texas, and transfer of their allowable to other field leases, has to date reduced daily salt-water production in that field by about 50,000 bbl. By this allowable transfer to wells making little or no water, the withdrawal of an estimated 25 million barrels of salt water with oil will be avoided over the next 3 years.

This practice, followed to only a limited extent so far, marks a new principle in allowable regulations in Texas, and may serve to level off, temporarily at least, the rising water-production rate in the field. The measure conforms to the Texas Railroad Commission's duty in promoting conservation in the great water-drive reservoir by facilitating the reduction of net withdrawals of Woodbine water produced with oil.

In recent years gross salt-water production has increased rapidly, as

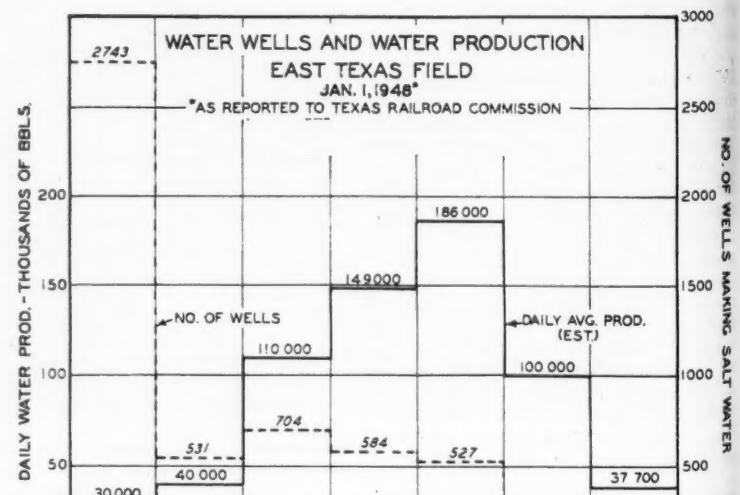
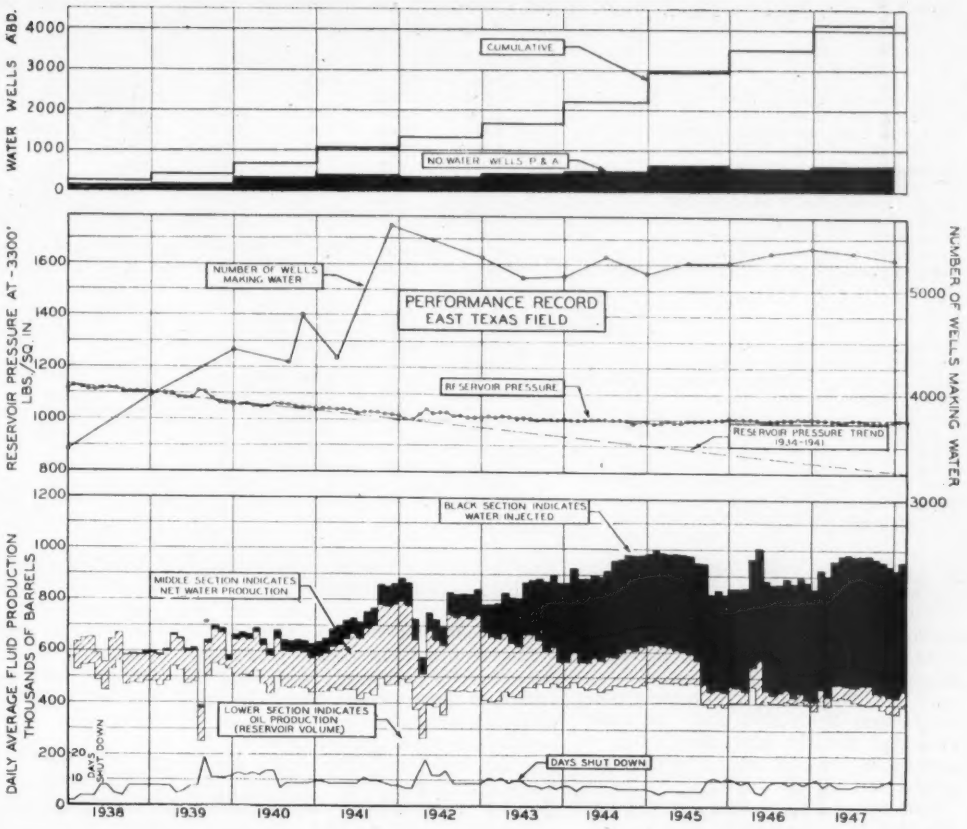


Fig. 2—(Right) This performance chart of East Texas field shows, graphically, the increase in water production and the strides made in reinjecting it to the Woodbine sand to maintain reservoir pressure. Data from the Texas Railroad Commission shows that abandonment of salt-water wells has about kept pace with the number of wells beginning to make water each year

Fig. 4—(Below) Although the rising rate of water withdrawals has shown a tendency to level off in recent months, due largely to transfer of allowable, work continues in the field on new injection projects. This circular settling pit is part of a new injection unit which is now being placed in operation in the north end of the field



This well-documented program* serves two important ends. As a means of disposal, subsurface injection remains the only possible solution at current production rates. More important, return to the Woodbine sand cancels the large fraction of voidage represented by water production, and makes possible sustained oil production at present rates without further reservoir pressure decline.

At the present time, over half of East Texas salt water comes from wells making 300 bbl. and over (Fig.

*For a history of East Texas Water Disposal see The Oil and Gas Journal: March 13, 1941, p. 36; October 9, 1941, p. 34; December 11, 1941, p. 34; December 18, 1941, p. 24; January 28, 1943, p. 175; February 4, 1943, p. 48; August 10, 1946, p. 72; August 17, 1946, p. 89; August 24, 1946, p. 86; August 31, 1946, p. 92; and November 11, 1947, p. 245.

formation water moved eastward to replace oil produced from the Woodbine sand. The degree of water encroachment is indicated by the latest water map (Fig. 1) which shows those areas of water production and abandonment as of January 1, 1948.

Water return to the Woodbine sand was begun experimentally 10 years ago, principally as a means of disposal. Today this program has reached major proportions, as shown graphically in Fig. 2. Daily, well over one-half million barrels of salt water is gathered, treated, and returned to the formation through 76 injection wells.

TABLE 1—EAST TEXAS WATER WELLS SHUT DOWN AND ALLOWABLES TRANSFERRED TO OTHER LEASES BY AUTHORITY, RAILROAD COMMISSION ORDER NO. 6-10,958

Date of transfer—	No. of wells	Production rate on test, bbl./day		Transferred oil allowable	
		Oil	Water	Beginning rate, bbl./day	Total bbl.
August 1	3	31.11	1,036	26.30	10,293.98
September 1	7	88.43	2,034	83.32	34,711.34
October 1	35	316.84	12,249	276.68	104,844.77
November 1	39	318.34	12,673	285.53	105,599.95
December 1	15	151.04	5,404	133.25	52,174.48
January 1	23	221.94	7,876	207.55	81,708.21
February 1	32	229.64	12,486	202.06	70,543.48
March 1	27	276.21	8,423	241.56	94,665.01
April 1	27	196.08	10,085	173.85	61,721.12
Total	208	1,829.63	72,266	1,630.10	616,262.34
Per well average	...	87.96	347	78.37	2,962.80

TABLE 2—RAILROAD COMMISSION OF TEXAS COMPOSITE OF SUMMARIES OF WELLS PRODUCING BY ARTIFICIAL METHODS AND WELLS MAKING WATER, EAST TEXAS FIELD

	1939	1940			1941		1942		1943
	Nov.	Apr.	Sept.	Nov.	Apr.	Dec.	June	Dec.	July
Flowing wells making water	873	949	793	905	759	1,118	961	877	888
Pumping wells making water	3,147	3,337	3,223	3,496	3,682	4,017	4,010	3,935	3,735
Pumping wells not making water	2,871	2,905	3,007	2,832	3,146	3,115	3,220	3,392	3,333
Total pumping wells in field	6,068	6,242	6,230	6,328	6,828	7,132	7,230	7,327	7,068
Air and gas-lift wells making water	335	331	320	386	458	524	559	535	530
Air and gas-lift wells not making water	385	454	447	463	429	455	439	462	526
Total air and gas-lift wells in field	720	785	767	849	887	979	998	997	1,056
Total wells making water	4,428	4,416	4,331	4,787	4,363	5,659	5,530	5,347	5,153
Total wells included in report	7,684	7,975	7,790	8,082	8,474	9,229	9,189	9,201	9,012
Total daily water withdrawal	199,738	179,681	187,811	205,492	387,653	439,106	435,550	418,043	407,159
Daily average water withdrawal per water well	45.11	38.93	43.31	43.02	100.68	77.59	78.76	78.18	79.01

	1944		1945		1946		1947		1948
	Jan.	July	Jan.	July	Jan.	July	Jan.	July	Jan.
Flowing wells making water	843	1,086	1,018	1,032	971	743	737	669	630
Pumping wells making water	3,832	3,786	3,778	4,027	4,139	4,491	4,653	4,687	4,691
Pumping wells not making water	3,348	3,257	3,500	3,519	3,606	3,819	3,974	4,120	4,242
Total pumping wells in field	7,180	7,043	7,278	7,546	7,745	8,310	8,627	8,807	8,933
Air and gas-lift wells making water	502	472	407	258	200	162	69	60	54
Air and gas-lift wells not making water	532	527	516	490	474	488	472	473	416
Total air and gas-lift wells in field	1,034	999	923	748	674	650	541	533	470
Total wells making water	5,177	5,344	5,203	5,317	5,310	5,396	5,459	5,416	5,375
Total wells included in report	9,057	9,665	9,757	9,824	9,742	9,911	10,120	10,239	10,276
Total daily water withdrawal	450,254	487,313	503,456	524,915	552,307	589,208	618,866	652,796	652,759
Daily average water withdrawal per water well	86.97	91.02	96.76	98.72	104.01	109.19	113.37	120.53	121.44

3). Based on data tabulated from reports submitted to the Railroad Commission as of January 1, 1948, 5,375 wells were making water in the field. (Table 2.) Of these, 2,101 or 39 per cent were each producing over 100 bbl. daily. Aggregate water production from this class of wells exceeded 682,000 bbl. daily, representing 89 per cent of the total water production in the field.

Salt-water production has been retarded to some extent by remedial work which reduces water-oil ratios by plugging off water sections below or above the oil-production sand on the west side of the field. Some relief has also been afforded by transfer of the oil allowable of high water producers to other wells on the same lease. Still, the rate of water production has risen faster than injection facilities can be installed, and some further means of retarding the increase seemed necessary. (Fig. 4.)

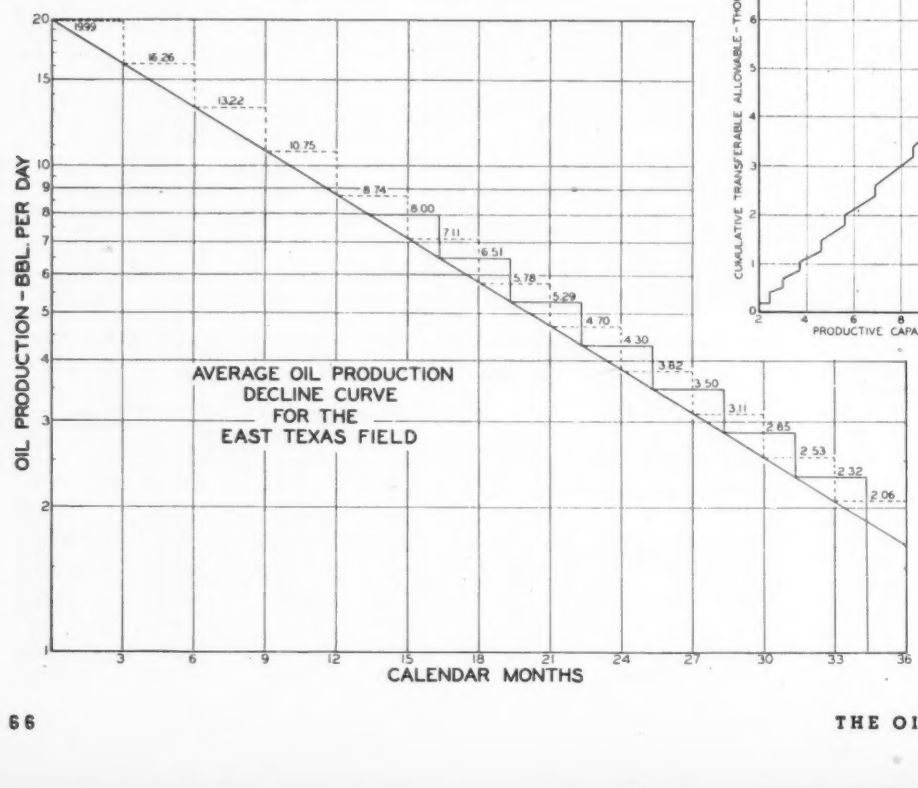
Last summer, companies engaged in salt-water disposal testified before the Railroad Commission that adequate facilities were not then available to handle increased water, and that additional injection units would not be available to keep pace with the increased rate within a reasonable time. Previously, the commission had approved special orders whereby two independent operators were authorized to shut in wells making several hundred barrels of water daily, and to take their oil allowable from wells on other leases at a fixed declining rate.

Special Orders Issued

This provision was offered to all

(Continued on page 85)

Fig. 6—(Right) This curve shows cumulative estimated transferrable allowable attending the shutin of water wells making from 2 to the allowed maximum of 19.99 bbl. of oil daily



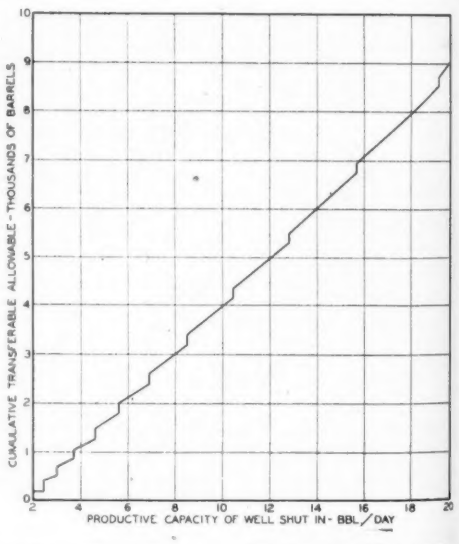
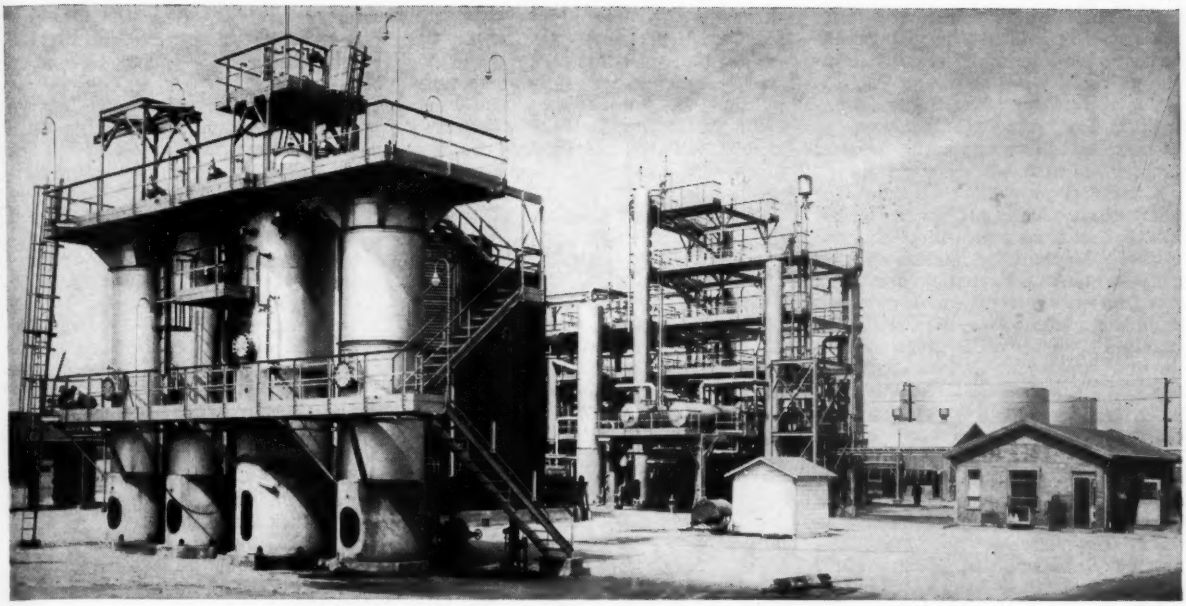


Fig. 5—(Left) This decline curve is used to compute the transferred allowable. As illustrated by the two examples, a well rated with maximum productive capacity of 19.99 bbl. will net the operator about 9,000 bbl. in transferred allowable, over a 3-year period. Shutdown of a well rated at 8.00 bbl. daily will allow transferred production of 3,000 bbl. over 21 months



General view of General Petroleum Corp. SO_2 extraction plant at Torrance, Calif. In foreground, reading from right to left in direction of flow are: sand filter, vacuum deaerator, calcium chloride driers No. 1 and No. 2. Back of these towers is seen a section of the mechanical-draft cooling tower. Next to right is the central structure of the unit followed by the compressor house and control house. Tanks in background are shipping tanks for finished products

SO_2 Extraction Unit Completed at General Petroleum's Torrance Refinery

by S. W. Dickey*

GENERAL PETROLEUM CORP. recently has put into operation at its Torrance, Calif., refinery, a new SO_2 extraction (Edeleanu) plant capable of producing 50-cetane diesel oil at a charge rate of 5,000 bbl. per day with an SO_2 contact rate of 125 per cent or 6,250 bbl. per day. The unit was also designed to process kerosine at a 5,000-bbl.-per-day rate and naphtha at 4,100 bbl. per day.

This new plant will serve to help meet rising requirements for high-quality diesel oils and kerosine. By delaying actual construction activities until 90 per cent of the equipment had been delivered to the site, the plant, which was designed and constructed by E. B. Badger & Sons Co., Boston, was completed in 8 months.

Process

The Edeleanu process is based on the selective-solvent principle employing liquid sulfur dioxide as the extraction agent. Essential features include a treating tower for contact of oil and SO_2, evaporator systems for recovery of SO_2 from raffinate and extract streams, facilities for continuously drying the SO_2, and a filter and deaerator system for removing moisture and air from the charge oil. A refrigeration system also is included for maintaining a low treating temperature.

Liquid SO_2 has the property of extracting compounds of high carbon-to-hydrogen ratio such as aromatics and olefins. Removal of these compounds is desirable since their presence causes a diesel oil to have a low cetane number and impairs the burning qualities of a kerosine. Also, compounds containing sulfur, nitrogen, and oxygen are removed which further improves product qualities.

Oil and SO_2 continuously enter the treating tower where they are intimately contacted and the compounds mentioned above are extracted. At low temperature the SO_2 is not miscible with paraffinic hydrocarbons and the SO_2-extract phase forms a bottom layer due to its greater density. The extract solution is then sent to a series of evaporators to recover SO_2; and the raffinate, containing a small amount of SO_2, is treated in a similar manner.

Degree of extraction is dependent upon the ratio of SO_2 to oil, temperature of treatment, and intimacy of contact. An increase in SO_2-to-oil ratio will result in a greater degree of extraction, which means a higher-quality raffinate at a reduced percentage yield.

In all cases care must be taken to avoid the formation of a single phase which would result from the treating temperature being too high or the SO_2 contact ratio being too low. Importance of treating at a low temperature is evident, but the level to which the temperature can be reduced is controlled by the pour point of the oil.

General Petroleum's Unit

A description of the flow through the unit at Torrance can best be accomplished by reference to the accompanying diagram. This drawing shows conditions of temperature and pressure at control points in the sys-

*General Petroleum Corp.

tem when producing 50-cetane automotive diesel. Operating conditions for both 50-cetane diesel and kerosine production are shown in Table 1. Yields and properties of the two commodities are given in Table 2.

Charge stocks are stored in tanks remotely located with respect to the SO_2 unit but conveniently located for receiving products cut on the crude units. The stocks are then charged to the SO_2 plant by pumps located at these tanks. Extreme care must be taken to assure the charge stock being completely free of water, and to this end diesel oil is given an air-blowing treatment before pumping into the SO_2 plant charge tank. A perfectly clear stock is obtained in this manner.

Kerosine is given a caustic treatment to extract naphthenic acid as it comes from the crude units, and a short period of settling in the charge tanks is a satisfactory means of drying this stock. Naphthenic acid is not removed from the diesel oil ahead of the SO_2 treatment because of the difficulty of eliminating the resultant cloud. Therefore, the naphthenics are present during treatment and concentrate in the extract product from which they are recovered by a caustic wash. The naphthenic acids are removed from these stocks for the purpose of obtaining the acids for further refining and subsequent marketing.

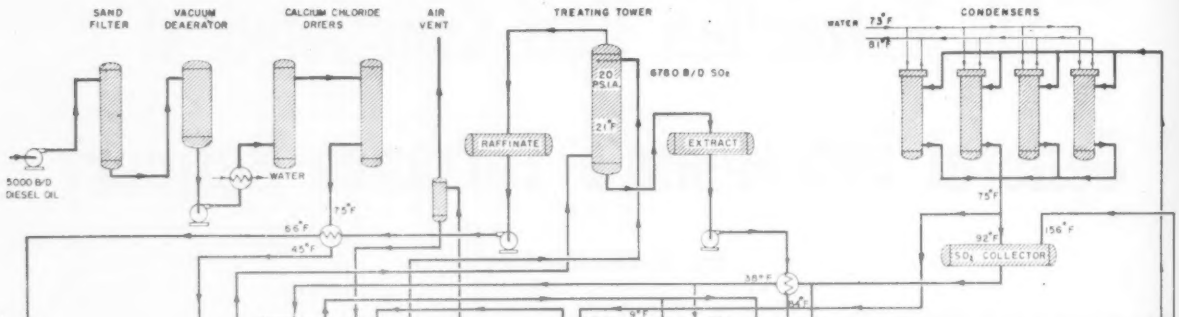
Further drying facilities are located within the boundaries of the SO_2 plant. The charge stock passes first through a sand filter for removing any suspended droplets of water. Presence of such suspended moisture is very rare because of the elaborate precautions taken to dry the stock. An alarm has been installed in the bottom of this vessel to sound warning if a large amount of water should accumulate.

Vacuum Deaerator

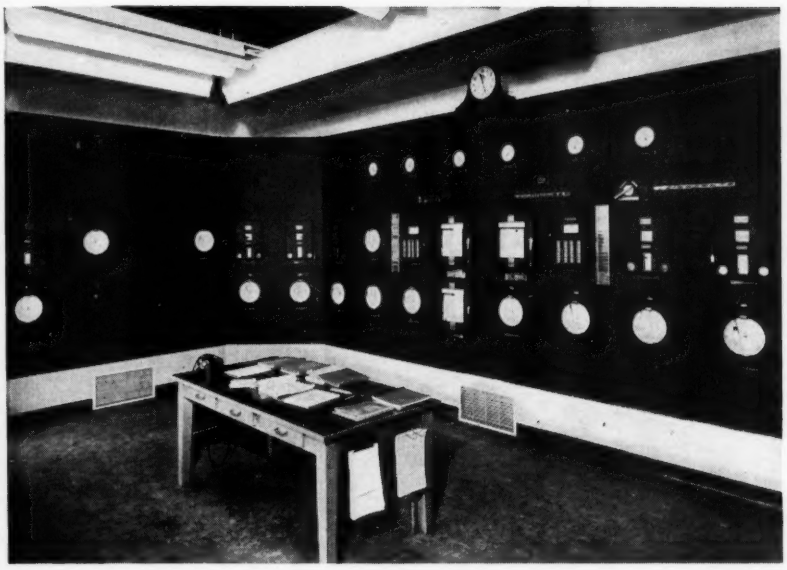
A vacuum deaerator is next in the order of flow. This removes dissolved air from the oil. High and low-level alarms are part of the equipment, and the oil level is held constant automatically.

From the deaerator a pump charges the oil through a cooler to two calcium chloride driers in series, and thence to the unit proper. A water alarm has been installed at the outlet of the cooler as additional safety against water entry. The driers are for the purpose of removing final traces of moisture from the feed and can be operated in series, parallel, or singly although the usual flow is in series.

From the drying system the charge passes through heat exchange with cold raffinate and thence through the tubes in the charge chiller to the bottom of the treating tower. The charge-chiller shell contains liquid SO_2 cooled by autorefrigeration which is dependent upon vaporization to the SO_2 compressor suctions. Liquid SO_2 is fed to the charge chiller from the main collector, passing through heat exchange with cold extract solution en route. SO_2 is then pumped from the charge chiller to the treating tower, entering at the top through a distributing ring and passing down through a section packed with 1¾-in. Raschig rings. Contact is thus made as SO_2 flows downward through the oil, extract solution settling out at the bottom of the tower and raffinate solution passing over the top. Flow of extract solution from the tower is regulated by an interface level controller which operates on the gravity differential between raffinate and extract solutions. When producing 50-cetane automotive diesel oil, the extract solution contains 84 per cent (wt.) SO_2



Flow diagram for SO_2 extraction plant of General Petroleum Corp. at Torrance, Calif.



SO_2 plant control room

TABLE 1—OPERATING DATA, DIESEL OIL AND KEROSINE

	50 Cetane diesel oil	Kerosine
Charge rate, B/D	5,000	4,550
SO_2 rate, B/D	6,750	7,300
SO_2 contact ratio, per cent	135	160
Temperatures, °F.:		
Treating tower	21	8
Charge chiller (shell)	27	14
Deaerator condenser (shell)	9	10
Main SO_2 collector	92	95
High-pressure SO_2 collector	156	156
Extract evaporators:		
Condenser-press. reboiler	245	234
Low-pressure reboiler	280	280
Vacuum reboiler	304	306
Raffinate evaporators:		
Condenser-press. reboiler	245	235
Low-pressure reboiler	280	280
Vacuum reboiler	300	304
Pressures:		
Charge chiller, psia.	20	15
Deaerator condenser, psia.	13	13
Treating tower top, psia.	20	15
Extract high-pressure evaporator, psig.	200	200
Condenser-press. line, psig.	80	80
Low-pressure line, psia.	13	13
Vacuum evaporator line, mm. Hg Abs.	60	190

and the raffinate solution 15 per cent (wt.) SO_2.

Raffinate and extract solutions collect in their respective accumulators from which they are sent to evaporators to recover SO_2. Three of these evaporators are used for processing raffinate solution, while four are used for extract. Both systems employ a condenser-pressure evaporator, low-pressure evaporator, and vacuum evaporator, but the extract system also uses a high-pressure evaporator. Reboilers incorporate temperature and level controllers and are operated on 175-lb. steam. Advantage is taken of the pressure differential between each tower to transfer liquid through the system instead of using pumps. Extract is pumped from the accumulator at the treating tower through heat exchange with SO_2 feed followed by heat exchange with SO_2 vapor from the high-pressure evaporator and next with hot extract from the vacuum evaporator.

Final heat adjustment before entering the high-pressure evaporator is made by a heater operating on 10-lb. exhaust steam. The heat applied at this point is controlled automatically to hold a 200-psig. pressure in the vapor of the high-pressure tower. Vapor from the high-pressure tower is condensed by heat exchange with incoming extract solution and with bottoms from this tower which have cooled by flash to the 80-lb. pressure of the condenser-pressure tower.

A portion of the SO_2 liquid formed by the vapor heat exchange with incoming extract solution is used for reflux to the high-pressure tower. Excess liquid from this source plus that from the condenser-pressure feed exchanger is accumulated in the high-pressure SO_2 collector and used for reflux to the two condenser-pressure evaporators and the SO_2 drier. Excess SO_2 in the high-pressure collector is transferred to the main collector by a level controller.

Extract next flows on level control to the condenser pressure evaporator which operates at sufficient pressure to condense the overhead SO_2 vapors, joined by vapors from the raffinate condenser-pressure tower, at the cooling-water temperature. A portion of the vapor is diverted by means of a remotely controlled butterfly valve to furnish feed vapor for the SO_2 drier.

The extract low-pressure evaporator takes its feed from the condenser-pressure reboiler and operates at compressor suction pressure which is on automatic control. Vapors from the raffinate low-pressure evaporator join this line. The low-pressure evaporators are furnished reflux from the main SO_2 collector. Extract next flows to the vacuum evaporator where final traces of SO_2 are removed. Vapor from this tower is joined by vapor from the raffinate vacuum evaporator en route to suction of the vacuum pumps. These pumps discharge into the suction of the SO_2 compressors along with vapors from the deaerator condenser, charge chiller, and low-pressure evaporators.

Discharge from the SO_2 compressors enters the condenser pressure vapor line which conducts vapors into the condensers. Liquid SO_2 from the condensers is then returned to the main collector to be used again for circulation in the process. The vacuum evaporators are furnished reflux from finished raffinate and extract streams respectively which have been chilled by passing through tube bundles in the deaerator condenser. Finally, extract is pumped from the vacuum reboiler through heat exchange with

(Continued on page 86)

TABLE 2—YIELDS AND PROPERTIES

	50-Cetane diesel oil			Kerosine			
	Charge	Extract	Raffinate	Charge	Extract	Raffinate	Acid treated raffinate
Vol. % based on charge	100.0	25.0	75.0	100.0	23.5	76.5	....
Color—union	3	6	1	....	1.5	....	....
Flash point, °F.	180	180	180	140	144	134	....
Sulfur, per cent	0.34	1.25	0.09	0.19	1.02	0.05	0.03
Conradson carbon, in 10 per cent bottoms	0.04	0.22	0.02	0.02	0.05	0.006	0.001
Aromatics and unsaturates	24	78	3	18	75.0	2.0	1.0
Aniline point, °F.	139.6	*13.9	169.5	128.8	*16.9	156.0	156.4
Gravity, °A.P.I.	32.8	20.7	38.2	38.4	26.8	42.5	42.4
Distillation:							
Initial	390	396	394	347	345	340	340
5 per cent	434	434	436	370	367	365	366
50 per cent	489	491	493	422	425	422	423
90 per cent	566	564	567	467	473	468	468
End point	616	628	614	500	509	499	500
Recovery	99	99	99	99	99	99	99
Octane number	40.0	....	50.0	....	....	....	....
Viscosity—SU/100	35	35	35	....	....	....	....
Pour, °F.	—30	....	—15	....	....	....	....
Color, Saybolt	....	....	....	14	....	30+	30+
Smoke point	....	....	....	18	....	27	27
72-hr. burning test	....	....	....	....	....	Failed	Good
Thermal viscosity	....	....	....	355	335	385	385

*Calculated.

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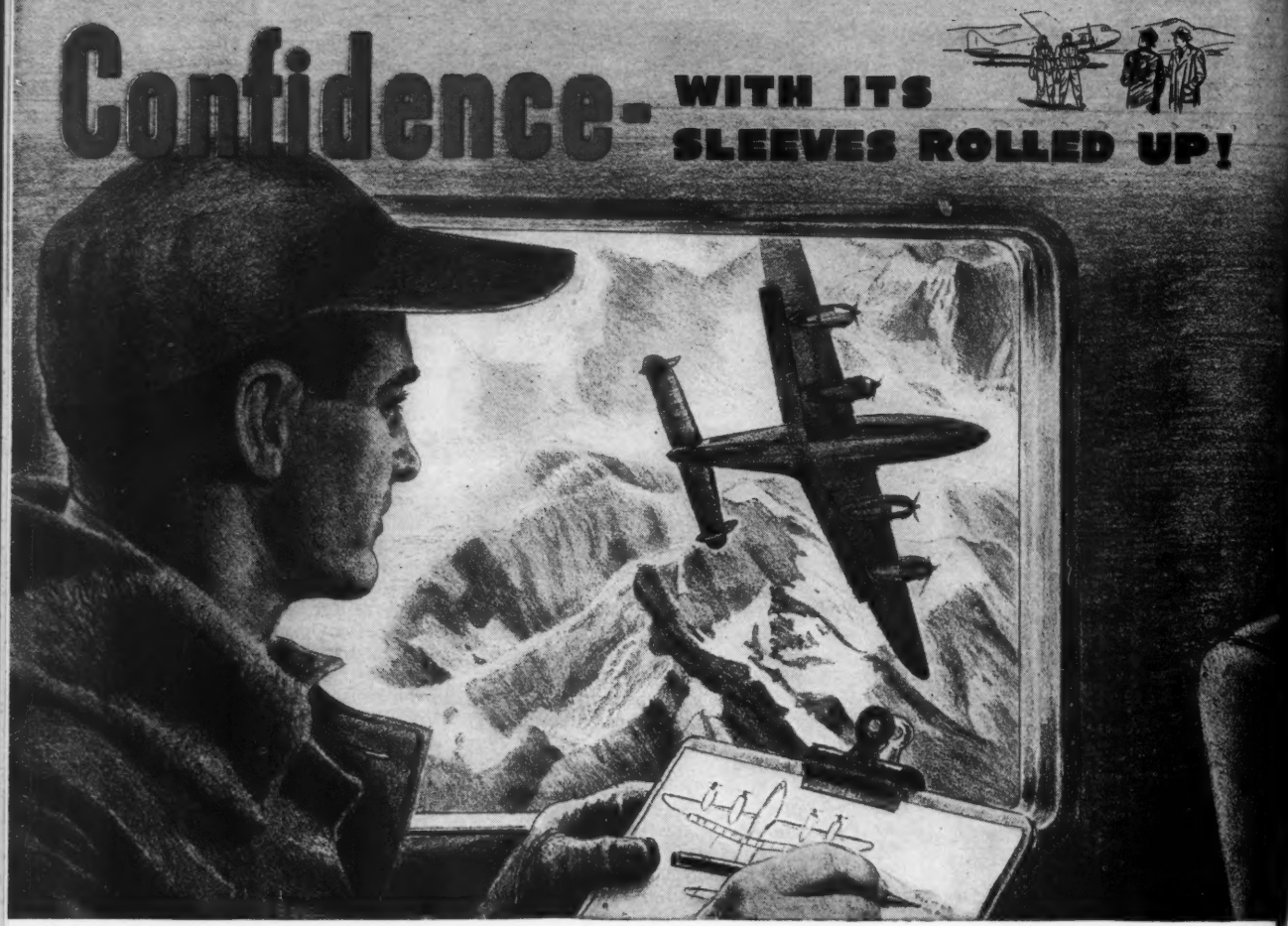

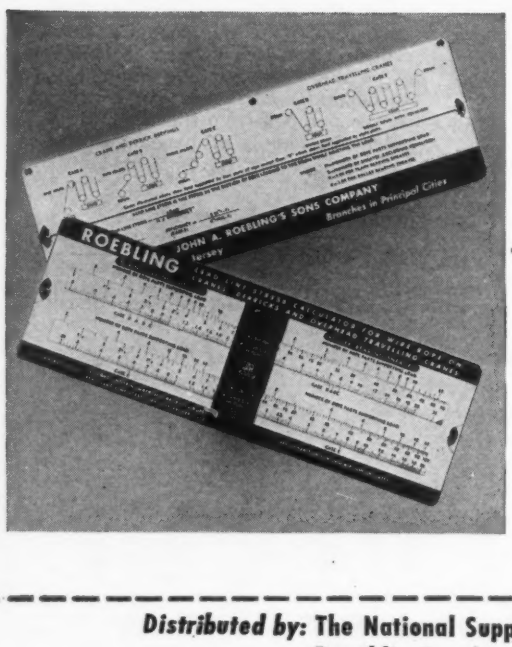

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New Mexico-Colorado 12,000 Square-Mile

San Juan Basin

Eyed by Several Majors and Independents

by Frank C. Barnes

CURRENTLY the San Juan basin is under close scrutiny by several major oil companies and many smaller operators. On the side lines are many more companies, closely following developments and preparing to move into the basin.

Geography

The San Juan basin includes an area of about 12,000 sq. miles, extending approximately 125 miles north and south from Durango, Colo., to Gallup, N. M., and averaging about 100 miles in width. This area actually includes the smaller Acoma, Chama, and Zuni basins, but for the purpose of this summary, these smaller units are considered as a part of the San Juan basin as a whole. This includes all of the area enclosed by the La Plata Mountains of Colorado on the north, the San Juan Mountains of Colorado-New Mexico on the north and northeast, and Nacimiento Mountains of New Mexico on the east, Mount Taylor and the Zuni Mountain uplift of New Mexico on the south, and the Defiance uplift and Carrizo Mountains of Arizona on the west.

The San Juan basin is one of the oldest oil-producing areas in the State of New Mexico. Oil was first discovered during 1911 in the Seven Lakes area, McKinley County. In 1921 Midwest Refining Co. (now Stanolind Oil & Gas Co.) discovered gas on southern Ute Dome in the Dakota sandstone, and in 1922 found high-gravity oil in the Dakota sandstone at Hogback. This touched off a play that continued throughout the twenties.

Interest lagged in succeeding years until the discovery of oil at Price, Colo., in 1935 revived activity again for several years. With the outbreak of World War II interest again centered on the basin and has continued to the present.

Geology

The rocks exposed in and around the San Juan basin range in age from pre-Cambrian granite and schist to Tertiary sediments and volcanics. As a rule the older rocks are exposed along the outer edges of the basin, faulted and upturned against the mountains. In the central portion of the basin there is a probable thickness of 14,000 ft. of sedimentaries. Volcanic plugs, dikes, and flows are prominent features in many parts of the basin.

Thus far oil and gas have been produced in commercial quantities only from the Pennsylvanian and Upper Cretaceous. However, there have been encouraging shows in other groups that might produce under proper conditions. At Rattlesnake and Tocito Dome, New Mexico, there have been strong shows of gas reported from the Ouray-Leadville limestone sequence of Devonian and Mississippian age. The Wingate sandstone (Jurassic) has shown oil saturation at several localities.

The majority of the structures that have produced commercial oil are folded anticlines or domes. There has been commercial gas and a little oil from stratigraphic traps on monoclines. There are 17 fields or areas that have produced oil or gas within the basin to date. Four of these are abandoned or have never produced more than a very small quantity. Ten of the 17 are anticlines or domes; the remainder are predominantly stratigraphic traps. Of the 75 to 80 known structures, 13 are now producing oil or gas; about 25 have never been drilled and not more than half of those tested have been drilled to the limit of possible production.

The general stratigraphic section and geology within the basin have been summarized in Table 2. Without going deeply into the descriptions or the controversy relevant to the individual formations, many questions can be answered by a brief description of the formations that have produced oil or gas to date.

Mississippian

The Ouray - Leadville limestone series are the oldest rocks that have produced oil or gas in the basin. The Ouray limestone is Devonian, but contains Mississippian beds in its upper portion. The Leadville limestone is Mississippian. This series has made large flows of gas at Tocito Dome in 17-26n-18w, San Juan County, and in Rattlesnake field, but there has been no commercial production. The series is about 150 ft. thick at Tocito Dome and about 200 ft. thick at Rattlesnake.

Pennsylvanian

Pennsylvanian rocks in the basin have produced commercial 42°-gravity oil at Rattlesnake, and gas at Barker Creek, all from the Hermosa formation, or its equivalent. The Pennsylvanian formations are considered one of the best potential sources of future gas and oil in the area. The Pennsylvanian has produced 489,600 bbl. of oil and 5,969,500 M.c.f. of gas within the basin up to January 1, 1948.

The Pennsylvanian rocks in parts of the basin are missing and younger rocks rest directly upon the pre-Cambrian. It is believed that persistent land masses existed within the Pennsylvanian seas. As a result, the Pennsylvanian rocks are thin, or lense out, along the border of these ancient "islands." There is a definite possibility of oil accumulation in stratigraphic traps within areas of Pennsylvanian overlap or wedging out that has received little attention thus far.

Jurassic

The Wingate sandstone has oil shows at its outcrop near Chama. It also yielded shows of 40°-gravity oil in a well drilled on the Beautiful Mountain anticline in 4-25n-19w, San Juan County. A well drilled in 3-27n-2e, Rio Arriba County, on the El Vado anticline also found shows of oil in the Wingate. There has been no commercial production.

Cretaceous

The Cretaceous sediments have been and still are the mainstay of exploration within the San Juan

THE AUTHOR

The author is geologist with the New Mexico State Oil Conservation Commission, Santa Fe. His previous work led him into geological activities in Arizona, California, Colorado, Montana, Nevada, New Mexico, Wyoming, and Utah. Former associations have been with the U. S. Geological Survey, American Smelting & Refining Co. and the U. S. Bureau of Mines, and Shell Oil Co., Inc. He spent a year in the Army during the closing stages of World War II, then went into consulting work and for the past 1½ years worked in the San Juan basin of Colorado (New Mexico).

TABLE 1—OIL AND GAS FIELDS OF THE SAN JUAN BASIN OF COLORADO AND NEW MEXICO

COLORADO

Field and year oil or gas discovered	Location	Contents and A.P.I. gravity	Productive formation	Generalized geology	Surface formation	Approx. dimensions of structure (miles)		Avg. depth to producing horizon in feet	Average thickness of pay zone in feet	Closure	Approx. productive acreage
						Length	Width				
Chromo* Ant. (?)	Archuleta Co. 32n-1, 2e (N. Mex. Mer.)	Oil 36	Mancos shale (U. Cret.)	A NW-SE trending anticline extending southward into N. Mex. Oil in openings in shale.	Mancos shale and Mesaverde	5	1.5	450 to 500	1 to 3	.....	....
Mancos Creek,* 1927	Montezuma Co. 32n-18w (N. Mex. Mer.)	Oil 34	Mancos shale	A terraced monocline with oil occurring in joints and cracks in shale.	Mancos shale	2	1	300 to 350	1 to 5	none	....
Price, 1935	Archuleta Co. 33n-1, 2e (N. Mex. Mer.)	Oil 32	Dakota ss. (U. Cret.)	A narrow NW-SE trending anticline.	Glacial debris in part and Mancos shale	1.5	0.6	1,100 to 1,200	150	600 ft.	320
Red Mesa,* 1924	Montezuma Co. 33n-12w (N. Mex. Mer.)	Oil and Gas 42	Mancos shale Dakota ss.	A narrow, domed, anticline with small closure.	Lewis shale	1	1	1,600 and 4,311	5 to 10 and 50	20 ft.	...

NEW MEXICO

Aztec,* 1920	San Juan Co. 30n-11w	Gas	Farmington ss. (U. Cret.)	Accumulation in lenticular sands in an area of arrested dip on a monocline.	Terrejon and Puerco	2	1	900 to 1,000	150	none	....
Barker Creek, 1925	San Juan Co. 32n-14w	Gas	Dakota ss., Paradox (Penn.)	A NE-SW trending, asymetrical anticline.	Mesaverde	10	6	2,500 and 9,000	30 and 75	300	....
Blanco, 1926	San Juan Co. 30n-9w	Gas	Farmington ss. Pictured Cliffs Mesaverde	Accumulation due mainly to the lenticularity of the containing sands. Gentle monocline.	Terrejon and Puerco	4.5	3.5	1,900-2,700-4,290	140-60-190	none	....
Bloomfield, 1924	San Juan Co. 29n-11w	Oil and Gas 55	Farmington ss.	Lenticular sands on a gentle monocline. Some gas in the Pictured Cliffs ss.	Terrejon and Puerco	2.3	0.5	720	20	none	800
Hogback, 1922	San Juan Co. 29n-16, 17w	Oil 65	Dakota ss.	An asymetrical dome. Some lenticularity of the containing sands.	Tocito ss. of Mancos shale	10	8	800	10	200 ft.	160
Hospah, 1926	McKinley Co. 17, 18n-8, 9w	Oil 30	Hosta ss. of the Mesaverde grp.	An unfaulted, irregular dome.	Mesaverde	1.5	0.8	1,600	40	50 ft.	960
Kutz Canyon, Fulcher basin, 1927	San Juan Co. 28, 29n-11, 12w	Gas	Pictured Cliffs	Gentle NE dipping monocline. Sands are lenticular and show differential porosity.	Terrejon and Puerco	5	2	1,950	90 to 100	none	....
Rattlesnake, 1924	San Juan Co. 29, 30n-19w	Oil 63 and 42	Dakota ss., Hermosa (Penn.)	An elongated, asymetrical dome.	Tocito ss.	4	2	800 and 6,750	50 to 70 30 to 40	350	450
Red Mountain,* 1934	McKinley Co. 20n-9w	Oil 43	Mesaverde	A fault structure.	Mesaverde	2.5	1	450	20	(?)	80
Seven Lakes,* 1911	McKinley Co. 18n-10, 11w	Oil 38	Mesaverde	Oil in lenticular sands on a monocline.	Mesaverde	1	0.5	300 to 400	10 to 20	none	160
Stony Butte,* 1928	San Juan Co. 21, 22n-13, 14w	Oil 31	Mesaverde	A NW-SE trending, faulted anticline.	Mesaverde	4.5	1.5	700 to 800	5 to 20	200	....
Table Mesa, 1925	San Juan Co. 27n-17w	Oil 56	Dakota ss.	A slightly elongated dome.	Mancos shale	4	2	1,325	12	150	160
Ute Dome, 1921	San Juan Co. 32n-14w	Gas	Dakota ss.	An asymetrical, faulted dome. Located south of the Barker Creek anticline.	Mesaverde	8	4	2,400	30	250 to 300	....

*Abandoned or not currently producing.

basin. There are five Cretaceous formations that have produced oil or gas in the basin; the Dakota sandstone, Mancos shale, Mesaverde group, Pictured Cliffs sandstone, and the Farmington sandstone member of the Kirtland shale.

The Dakota sandstone is producing oil or gas at Price, Colo., and at Barker Creek, Hogback, Rattlesnake, Table Mesa, and Ute Dome in New Mexico. All of the Dakota production has thus far been from anticlines or domes. No other type of structure has produced commercial Dakota oil within the basin. The cumulative Dakota production to January 1, 1948, has been over 10 million barrels of oil and more than 18,600,000 M.c.f. of gas.

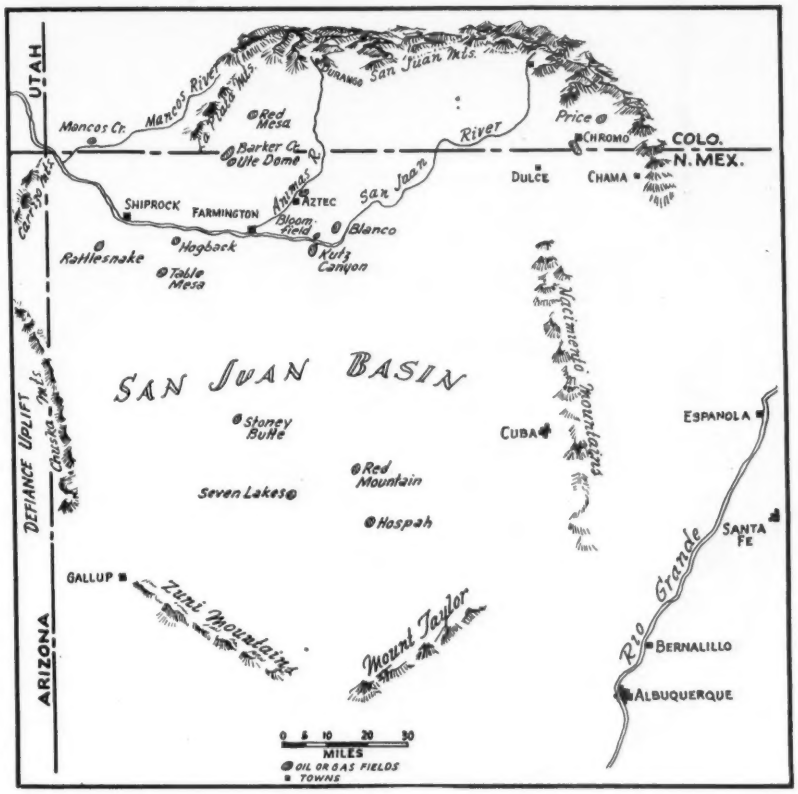
The Mancos shale has produced excellent oil shows at numerous localities within the basin, but no commercial production. Many rumors, much speculation, and very little oil have come from this formation.

Examination of several wells has shown that the producing zone is a dark gray to black calcareous shale. Accumulation is generally in faulted or folded areas where the producing zone has been much broken, and openings thus created hold the oil. There is no continuous reservoir, and as soon as all of the oil has drained from the connecting joints or cracks, production ceases. Some of the sand lenses in the upper and lower portion are found to contain water. This possibility should always be taken into account when drilling through the Mancos.

The Mesaverde group has produced oil or gas at five localities within the San Juan basin: Blanco, Hospah, Red Mountain, Seven Lakes, and Stoney Butte. Two of these occurrences are anticlinal folds, three are stratigraphic traps on monoclines. The sands are lenticular and stratigraphic conditions are probably as important as structure. The cumulative production from the Mesaverde was about 3 million barrels of oil as of January 1, 1948. Gas production was less than 1,000,000 M.c.f., but there is a high future potential.

The Pictured Cliffs sandstone has proved to be a good gas producer at Blanco, Kutz Canyon, and Fulcher Basin, New Mexico. It has not produced commercial oil at any locality to date. None of the gas-producing areas show folding or reversal, and accumulation is due mainly to favorable stratigraphic conditions. The production has been over 34,800,000 M.c.f. of gas to January 1, 1948.

The Farmington sandstone member of the Kirtland shale has produced oil or gas at Aztec, Blanco, Bloomfield, and Fulcher basin, New Mexico. Production is generally small on a per-well-per-day basis. Most wells make from 1 to 10 bbl. of oil and from less than a million to 2 million cubic feet of gas per day. Not all oil wells produce gas and vice versa. The oil averages close to 55° gravity. None of the producing areas show folding and here again stratigraphic conditions seem to be responsible for the accumulation.



Map of San Juan basin, in New Mexico, Colorado, and Arizona

General Considerations

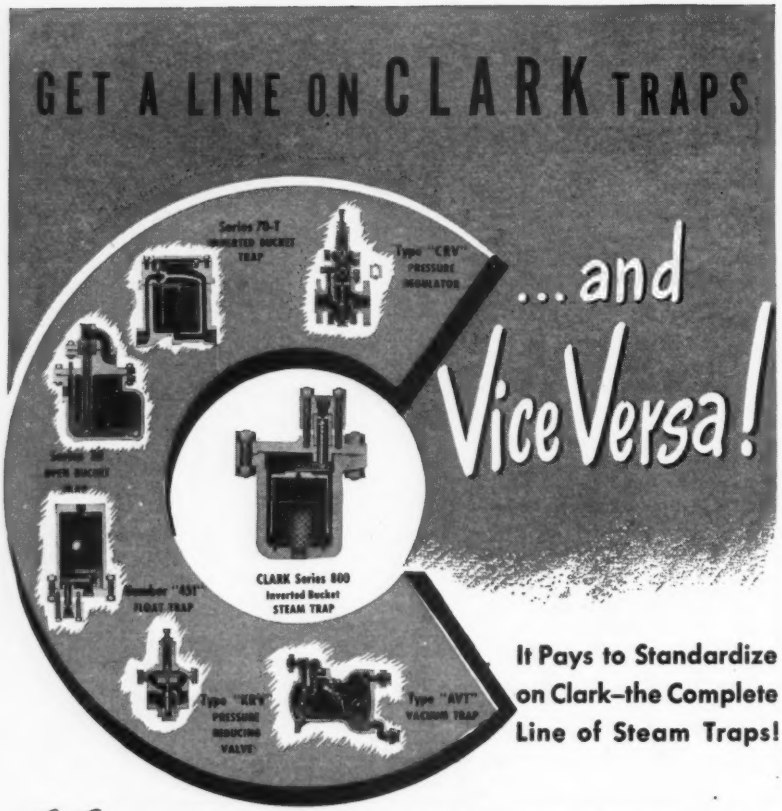
Prospecting within the San Juan basin has thus far followed the accepted practice of seeking and drilling anticlines, domes, or structural highs. All of the production to date has been found as the result of surface geology. There has been, and is at present, considerable geophysical prospecting. Wells have been drilled for a variety of reasons, but, unfortunately, exploration and drilling have not always been carried out on a sound geologic basis. There are many problems and possibilities within the basin that offer very remunerative opportunities for those capable of solving them. However, the solution of these problems will require much research and study of a long range variety that cannot be depended upon for an immediate return.

The San Juan basin has within its borders a variety of geologic phenomena which embrace many unique problems. Most of these problems are variations or complexities of problems that have been met and solved in other areas within the Rocky Mountain province. There are, however, several that are not common to outside areas and seem to be peculiar to the basin.

Although the basin is considered as a part of the Rocky Mountain petroliferous province, it is nevertheless on the southern extremity of that province. The fact that it is an area that is transitional from the Rocky Mountain to the Basin Range and Colorado plateau provinces may have some influence on structure and accumulation.

The possibility of oil accumulation within areas of Pennsylvanian overlap or lensing out has already been mentioned. It is also known that the Pennsylvanian formations change considerably in character in parts of the basin. There is a much thicker sequence of sandstone in some places than in others, especially to the north. Along the margin of these thick sand and shale members, where they lense

*Abandoned or not currently producing.



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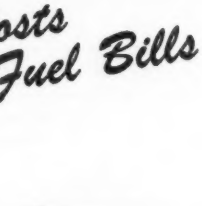

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out, is another untried zone of possible accumulation.

Although the Upper Cretaceous series has been the mainstay of production and drilling activity within the basin, still there is much to be learned even here. Only in recent years has the interfingering relationship between the various Cretaceous formations been understood. The basic reasons for accumulation of oil and gas in many of the sands have not been explained.

The effect of porosity and permeability changes over large areas and their influence on migration and accumulation within the lenticular Cretaceous sands is not known. The extent of water drive within the lenticular sands and the effect of no water drive within some of them are open to study. The interfingering and intertonguing of many of the Cretaceous sands and shales creates zones that could serve as stratigraphic traps in many places.

Many Igneous Dikes

Some geologists hold the opinion that a majority of the potential producing structures within the Rocky Mountains have been flushed of their oil and gas by circulating ground water. This may be true to some extent within the San Juan basin. On the other hand, any local or regional feature that affects the movement of ground water would then have a bearing on the oil and gas accumulation. The San Juan basin contains many igneous dikes and plugs that might influence circulation or prevent it. Some faults would have a like effect. The lenticularity of many of the producing sands would also influence the circulation of ground water.

There are local areas within the basin that are isolated from possible connection with any outcrop by faults, dikes, lenticularity, or a combination of factors. In these isolated areas where no water or water drive exists, it is reasonable to assume that any oil present would be more apt to accumulate in structural lows rather than the highs. In southeastern Utah oil has been found along the axis of the Mexican Hat syncline. The possibility of local synclinal accumulation in certain areas in the San Juan Basin is worth consideration.

Practically all of the structures drilled in the basin have been anticlines or domes. There are other possible producing structures that have received little or no attention. The possibility of local closure against dikes, faults, or a combination of the two has received almost no consideration. Unconformities have been ignored even though they are known to exist at several horizons within or between the various formations. The updip lensing out of sands, or loss of porosity or permeability updip to form local traps have not been considered as such. This latter possibility

TABLE 2—GENERALIZED STRATIGRAPHIC SECTION—SAN JUAN BASIN—COLORADO AND NEW MEXICO

Age—	Formation	Character	Average thickness in feet	Remarks
Pleistocene		Glacial debris, gravels, boulders, etc.	0 to 250	In or near the mountains only.
Eocene and Paleocene	Wasatch	Massive, resistant, gray to brown ss. interbedded with variegated shale.	250 to 1,000	Fluviatile, arkosic in part.
Paleocene and Cretaceous	Nacimiento group (Terrejon and Puerco)	Lenticular, gray and brown ss. and gray and greenish shale.	1,200 to 1,500	Fluviatile.
	Animas formation	Lenticular, gray and brown ss. and shale. Andesitic debris.	1,200 to 3,000	Fluviatile restricted to north.
Upper Cretaceous	Ojo Alamo sandstone	Brown ss. and variegated shale.	50 to 170	
	McDermott formation	Light purple, andesitic, tuffaceous ss. and shale.	30 to 240	
	Kirtland shale (Farmington ss.)	Light gray and blue gray shale with lenticular brown ss.	630 to 1,180	Produces oil and gas.
	Fruitland formation	Gray ss. and gray shale.	190 to 525	Fresh and brackish water origin.
	Pictured Cliffs ss.	Light gray and buff ss. with gray shale in lower portion.	30 to 280	Produces gas.
	Lewis shale	Gray and greenish gray shale. Lenses of ss. and limestone.	100 to 2,000	Marine.
	Mesaverde group—Cliff House, Menefee, Point Lookout	Massive, buff and gray ss. separated by brown and gray shale. Coal bearing.	300 to 1,800	Marine and brackish water origin. Oil and gas.
	Mancos shale	Gray to black shale with ss. lenses. Tocito ss. lentil.	800 to 2,000	Marine. Shows of oil and gas.
	Dakota sandstone	Light brown ss. with shale lenses and thin coal seams.	200 to 250	Produces oil and gas.
Jurassic	Morrison formation	Interbedded gray and brown ss. with variegated shale.	300 to 600	
	San Rafael group	Red and dark gray shale.	0 to 40	
	Navajo sandstone	Buff and red ss. and gray shale.	70 to 100	
	Kayenta sandstone	Dark red, sandy shale and dark gray shale.	40	
	Wanakah formation	Gypsum and limestone.	0 to 100	
	Entrada sandstone (Wingate)	Red and orange ss. with thin beds dark red and gray shale.	300 to 570	Shows of oil.
Triassic	Chinle formation	Red shale and some sandstone.	1,500	
Permian	Cutler formation	Red sandstone and red shale.	1,400	
Pennsylvanian	Hermosa and Paradox formations	Limestone with ss. and shale. Gypsum and salt.	1,000 to 2,000	Produces oil and gas. Marine.
	Molas formation	Dark gray and purple shale.	25 to 80	
Mississippian	Leadville limestone	White and brown limestone.	100	Marine. Shows of gas.
Devonian	Ouray limestone	Light gray limestone.	100	Marine
	Elbert formation	Limestone, sandstone, and shale.	100 to 150	Marine.
Cambrian	Ignacio quartzite	Quartzite, sandy shale and conglomerate.	2 to 80	
Pre-Cambrian		Granite and schist.	....	

is probably responsible for some of the oil and gas now being produced, particularly in those areas where there is a total lack of folded or structural traps.

It is strongly advised that operators planning future work in the basin make a careful study of the location they are interested in or the general area they plan to work. The services of an experienced geologist are a necessity if costly mistakes are to be avoided. The basin will pay dividends to those who approach it in the proper manner, other things being equal. The San Juan basin is not only an interesting area to the geologist, but a profitable one for those willing to approach it in a scientific manner.

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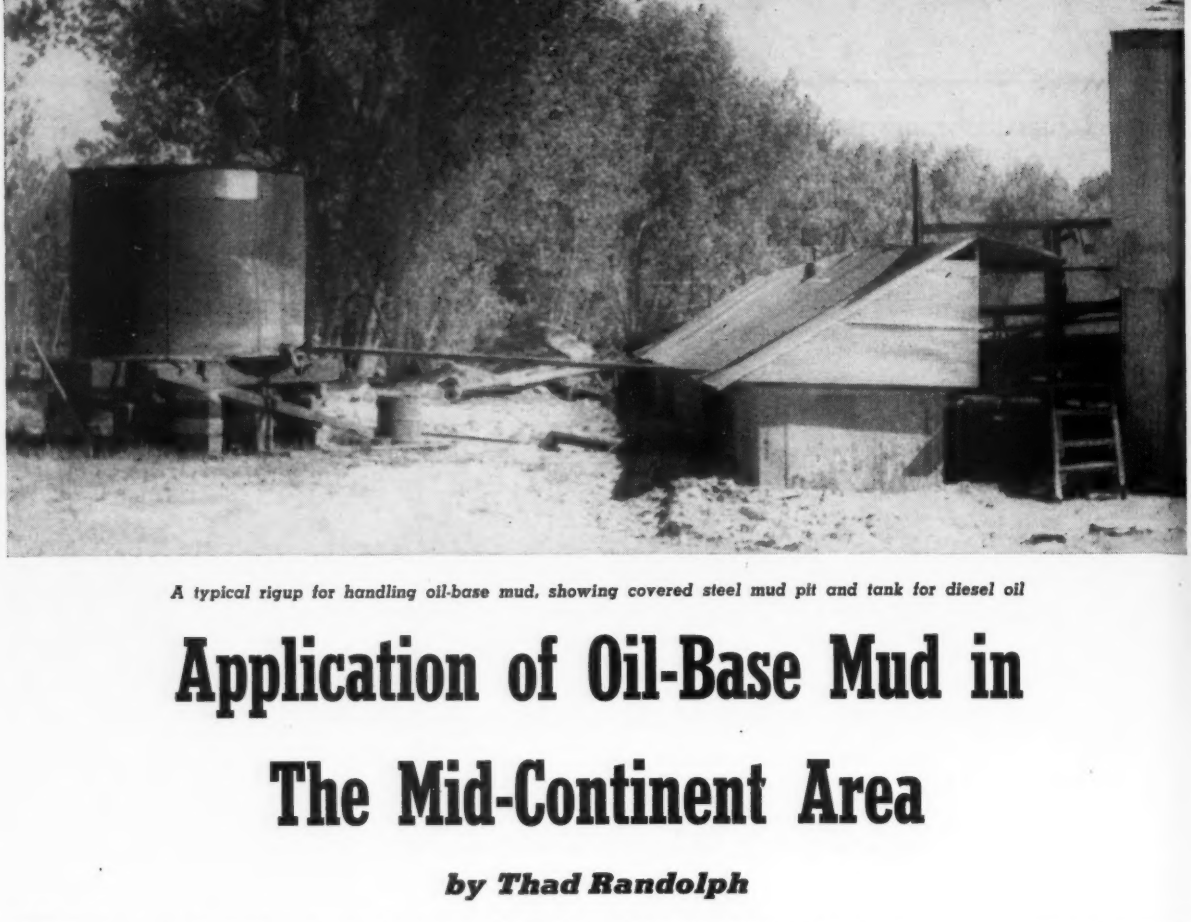
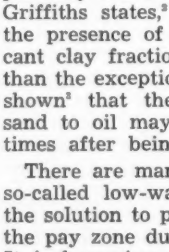


A typical rigup for handling oil-base mud, showing covered steel mud pit and tank for diesel oil

Application of Oil-Base Mud in The Mid-Continent Area

by Thad Randolph



The author joined Oil Base, Inc., in November 1945, following a period of service as lieutenant, USNR, and is now manager of the Mid-Continent Division. A graduate of Oklahoma A. & M. College in 1936, with a degree of bachelor of science in chemical engineering, Randolph worked for Stanolind Oil & Gas Co. as roustabout, switcher, roughneck, and mud engineer until May 1937, when he joined Baroid Sales Division of National Lead Co.

WITH the ever-increasing demand for petroleum, the rise in price, and the decrease in the discovery of new reserves, it is becoming imperative that more efficient exploitation methods be utilized. Under certain conditions one of the most practical and obvious methods of procuring the maximum productivity from a reservoir is by drilling the pay zone with oil-base mud.

It has long been known that water and water-base mud have a harmful effect on the productive capacity of most oil sands. Scarce indeed is the production man who cannot recall at least one instance of killing a well with water or water-base mud for remedial work of one type or another, and then, on recompletion, having that well fail to come up to its previous production, or even fail to produce at all. It is reasonable to assume that if a well is damaged in this manner, similar damage is done in the original drilling of the pay zone with water-base mud, even though it may on the surface have looked like a good well on original completion.

Three Factors in Completions

Reasons for the damage to certain zones drilled with water-base mud have been thoroughly investigated in the laboratory with the conclusion that it is primarily due to three factors: (1) swelling of the clays inherent in the sand, (2) jamin action,[1] or "water blocking," and (3) difficulty of removing filter cake.

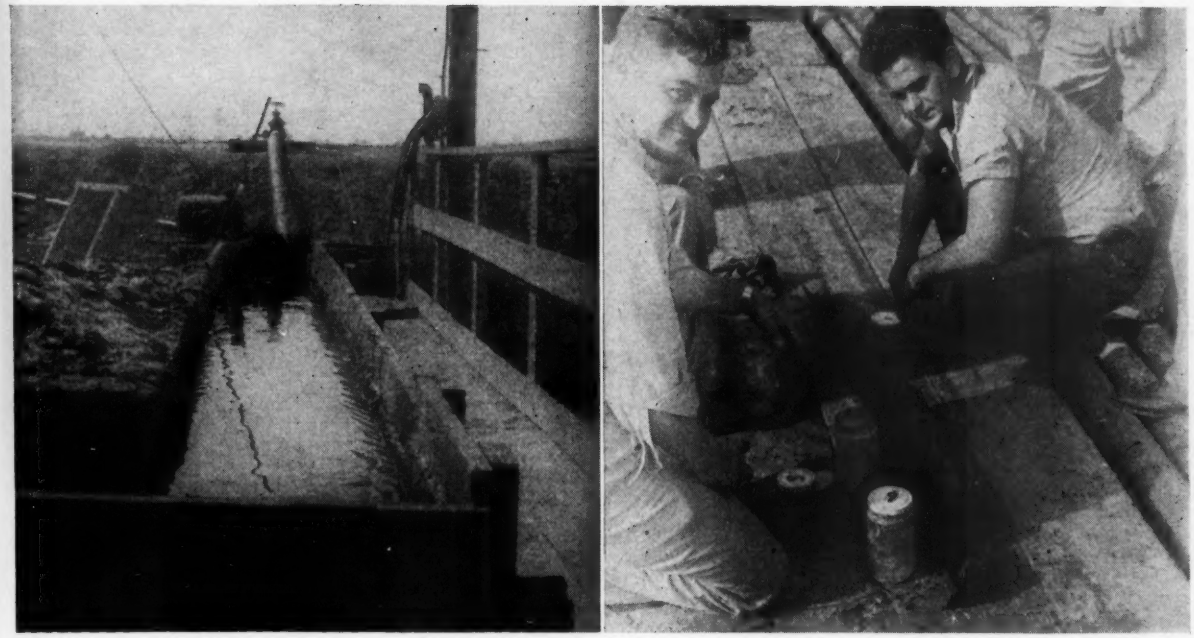
Of the three effects the first is probably the most important for, as Griffiths states,[2] "in sand reservoirs the presence of a small but significant clay fraction is the rule rather than the exception." Also, it has been shown[3] that the permeability of a sand to oil may be reduced several times after being exposed to water.

There are many indications that a so-called low-water-loss mud is not the solution to preventing damage to the pay zone due to water intrusion. It is becoming more and more evident that an A.P.I. water-loss test is no measure of the amount of water lost to a permeable zone down the hole. In a recent paper[4] Barkis and Wright cite an example wherein the emulsion mud in use had a weight of 9.3 lb. per gallon and an A.P.I. filtration rate of 1 cc., truly a low-water-loss mud. In spite of this low A.P.I. filtration, it was found that on establishing circulation after a 14-hour shutdown, the mud returns from bottom weighed 10.6 lb. per gallon, instead of the original 9.3 lb., showing a great loss of water from the mud to the pay zone.

An even more startling example is a recent completion wherein the operator drilled the pay zone (at about 11,000 ft.) with salt-water starch mud having an A.P.I. fluid loss of 0.8 cc. After several attempts at completion, the well was finally completed on the gas lift for 59 bbl. per day, cutting 18 per cent mud and water. After further consideration, however, the operator went back in the well, whipstocked out of the casing just above the pay zone, and redrilled the sand with oil-base mud. Upon completion this time, the well came in flowing for 455 bbl. daily through a 28/64-in. choke.

Types of Oil-Base Mud

There are two types of oil-base mud commercially available today. The essential difference between them lies in their maintenance characteristics. One type is highly susceptible to water contamination[5],



Left: A good settling ditch facilitates removal of cuttings. Right: Showing oil-base core of oil sand at McFaddin, Tex. Previous water-base cores were unconsolidated and mushy in appearance

while the other type will stand above 10 per cent water contamination with no noticeable change in mud characteristics. This latter type has the added advantage that excess water can actually be treated out of the mud chemically.

A good oil-base mud has all the desirable attributes of water-base mud plus added advantages, such as: (1) it has a weight range from 7.8 to 16.0 lb. per gallon; (2) it has zero fluid loss in 1 hour on A.P.I. tester; (3) it is unaffected by salt, anhydrite, cement, or any of the normal water-base-and-mud contaminants and is therefore easy to maintain; (4) the filter cake is soluble in crude oil and is immediately deplastered on completion of the well; (5) any fluid filtered into the pay is oil (diesel-fuel) and will not damage the sand as water does. Of these advantages, numbers (4) and (5) have been found to be most important.

Oil-base mud has long passed the experimental stage. Though only introduced to the Mid-Continent area about 2 years ago, it has been used extensively in California for 6 or 7 years. Due to this fact, there are many more data available on production comparisons between water-base and oil-base completions in California fields. Other writers[6 7 8 9] have cited numerous examples wherein the superiority of oil-base mud as a completion fluid has been demonstrated in California fields. Therefore this article will deal with applications in the Mid-Continent area.

Comparisons of Completions

It is recognized that accurate comparisons between productive capacity of any two wells is practically impossible due to the large number of indeterminate variables. There are, however, several outstanding examples that leave little doubt as to the effectiveness of oil-base mud, in spite of the lack of complete information.

McFaddin, Tex.—One of the first oil-base completions in the Mid-Con-

TABLE 1

	Type completion	Producing zone	Pay section open (ft.)	Hole size in pay zone (in.)	Top 1st Bromide (ft.)	Initial P.I.	Choke size (in.)	Rate, bbl. per day
Well "A" oil-base mud	Open hole	1st and 2nd Bromide	271	6⅛	—9,755	5.55	9/64	261
Well "B" water-base mud	Open hole	1st and 2nd Bromide	307	9	—9,680	2.67	9/64	251

TABLE 2

Well—	Elevation (ft.)	T.D. (ft.)	Casing (in.)	Top of 2nd Deese sand (ft.)	Net sand thickness (ft.)	Production tests	Choke, in.	Pressure, psi.	Remarks
Oil-base Well "A"	914	4,650	7 at 4,605 ft.	4,605 (—3,691)	36	F/186 oil 24 hr.	19/64	TP-375 CP-400	Pay drilled with Black Magic. No swabbing
Water-base Well "A"	930	4,680	5½ at 4,680 ft.	4,618 (—3,688)	27	P/75 oil 24 hr.	2½ tbg.	TP-0	Well on pump. Will flow by heads
Water-base Well "B"	915	PB 4,615	5½ at 4,570 ft.	4,567 (—3,652)	35	F/96 oil 24 hr.	1 csg.	(?)	Production decreasing. See Note 1.
Water-base Well "C"	973	4,681	5½ at 4,650 ft.	4,619 (—3,646)	24	Bailed dry			Perforated second Deese behind casing. No oil. See Note 2.

Note 1: Water-base Well "B" was drilled to 4,581 ft. with rotary and completed with cable tools. First Deese sand was perforated with 80 shots 4,498-4,518 ft. and second Deese shot with 50 qt. nitro January 20, 1948. Well now flows at 125 bbl. per day maximum rate from both sands.

Note 2: Water-base Well "C" perforated first Deese sand. Marble shot both sands. Shot second Deese with 100 qt. nitro. Now flows 20 bbl. per day by heads.

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tinent area was made here. In this field it was known that a thin stringer sand overlying the main pay zone was oil bearing. Several previous attempts at completion had met with complete failure. The operator set pipe on top of the sand, changed to oil-base mud, and cored about 4½ ft. of sand. Core recovery was 100 per cent of consolidated sand, whereas previous core recovery with water-base mud had been low, and the sand recovered was unconsolidated. Of interest here is the fact that a piece of the oil-base core placed in a pail of water completely disintegrated in a short time. The oil-base mud was displaced with crude oil, and the well started flowing by heads. Due to the low bottom-hole pressure it was necessary to put the well on gas lift by which means it was capable of producing about 70 bbl. daily from a sand in which all previous completion attempts with water base mud had failed.

Tussy field, southern Oklahoma.—An operator set casing on top of the upper Tussy sand, changed over to oil-base mud, and drilled the sand. On displacing the oil-base mud with crude oil the well started flowing pipe-line oil immediately and was gaged at 91 bbl. daily on a 20/64-in. choke. An offsetting well, drilled 4 years previously, producing from the same zone, and with an equivalent sand thickness, was completed for 60 bbl. daily on the pump. The operator has since established the use of oil-base mud for drilling the pay zone as standard procedure in this field.

Charlotte, Atascosa County, Texas.—This is another excellent example of the effectiveness of oil-base mud as a completion fluid. The following is quoted from an article by George E. Cannon,[10] Humble Oil & Refining Co., Houston: "The 5 McBride was located in Charlotte field, Atascosa County, Texas, where completion in the Navarro sand has been a problem. Cores of the Navarro sand were obtained using oil-base drilling mud. As much as 200 hours swabbing time had been required to complete wells drilled in the Navarro sand, and some swabbing required on all the wells. In the 5 McBride, 7-in. casing was set on top of the Navarro sand at 5,021 ft. The water-base mud was displaced with oil-base mud before drilling the cement plug. The well was cored to 5,106 ft. Completion was made by displacing the oil-base mud with crude oil, after which the well flowed without swabbing."

Several more oil-base completions have been made in this field since the above was written, with similar results. The elimination of swabbing and cleanup time is characteristic of oil-base completions and has in many cases more than offset the additional cost of using oil-base mud.

North Lindsay, Oklahoma.—The first oil-base completion was made in May 1947. In this well 7-in. casing was set at 10,800 ft. on top of the first Bromide sand. The water-base mud was displaced with oil-base and diamond coring commenced. Seven diamond cores were cut from 10,803 to 11,074 ft. with 99.1 per cent recovery. The hole was bottomed in the second Bromide sand. The oil-base mud was displaced with crude oil, and the well came in immediately, flowing pipe-line oil at a high rate. Table 1 shows a comparison between this well and a direct offset completed with water-base mud at about the same time. It will be noted that despite the fact that the oil-base completion was 75 ft. lower on structure, had 36 ft. less Bromide section open, and had 6⅛-in. hole in the pay against 9-in. hole on the water-base completion, it had an initial productivity index of more than double that of the water-base offset. Of still more significance, at the present writing oil-base Well "A" is the only well in the field that will make its allowable of 300 bbl. daily on a 10/64-in. choke, in spite of the fact that it has recently started making about 2 per cent salt water. There are four wells in the field with more pay zone open, and three of these are higher on structure than oil-base Well "A."

East Brady, Southern Oklahoma.—A recent oil-base completion has probably afforded the best comparison of any to date in the Mid-Continent area. There are three offsetting water-base completions with which to compare, and practically all of the factors affecting productivity are known. It will be noted from Table 2 that although oil-base Well "A" has a lower structural position and a similar sand section to the three offsetting water-base completions, it shows a much greater productivity. The oil-base completion came in flowing immediately on displacement of the oil-base mud with crude oil, while all of the water base completions had to be swabbed. In this field the saving in completion time alone will in many cases more than offset the added cost of completing with oil-base mud.

True Oil-Base vs. Emulsions

There has been some confusion between oil-base mud and oil-base emulsion mud. A true oil-base mud has no water present. An emulsion mud is essentially a water-base mud to which oil has been added. All emulsion muds to the writer's knowledge have a water-loss on the A.P.I. tester. Insofar as damage to a pay zone is concerned these muds should have a similar effect to an ordinary water-base mud.

Some sources have pointed out that the surface tension of the water and oil filtrate from an emulsion mud is lower than that of an ordinary water-base mud and thus causes no damage to the oil zone. This is not the case because it has been proved[1] that water-blocking effect is not alleviated by a lowering of surface tension but rather by the raising of the vapor pressure.

Oil-base mud, although primarily designed as a completion fluid, has many other uses. It has been used extensively and very successfully in coring operations. Core recovery has been consistently above average. In view of the fact that a good oil-base mud has no water present, it is conceded that analysis of oil-base cores is the best practical and direct means of procuring a true connate-water determination of a producing zone.[11]

Oil-base mud has been used in conjunction with diamond coring in many areas with excellent results. One advantage of oil-base mud in this is that it is not adversely affected by the slow circulating rates necessitated by diamond coring. In one deep Oklahoma field where extensive diamond coring has been done it has been noted that in every case where water-base mud was used considerable time was spent in conditioning mud while there is not 1 hour of mud conditioning time shown on any of the wells using oil-base mud. This is due to the stability of oil-base mud and the ease of maintenance. Another advantage in diamond coring is that very little fluid erosion of the matrix has been noted, probably due to the low solid content of oil-base mud and inherent lubricating qualities present. It has also been noted that jamming of core barrels with shale cores has been virtually eliminated where oil-base mud is used.

Other Uses

Other uses include killing producing wells for workover operations, freeing of stuck drill pipe in drilling wells, and top-hole drilling where a "to gage" hole is considered of sufficient importance. It is felt that oil-base mud should be very effective for drilling some of the "heaving shales" encountered in the Gulf Coast area due to the lack of water present in the mud and the ease of maintaining a high mud weight.

Since oil-base mud is unaffected by cement, salt, anhydrite, gypsum, and the other common contaminants of water-base muds, its maintenance is very simple. Some special equipment is recommended for the proper handling of oil-base mud, primarily to eliminate unnecessary losses. A steel, wooden, or concrete suction pit is practically a necessity, since it has been found that contamination and losses in earthen pits are excessive. Storage tanks for proper storage are required since the mud is recoverable and may be used over and over again for a series of wells. There are records of the same mud being used on as many as 25 wells with very little if any treating being necessary. The use of good pipe wipers, sawdust on

If it's production you're after...

Note the close resemblance in every detail except production figures	WELL A completed with BLACK MAGIC	WELL B completed with WATER-BASE MUD	WELL C completed with WATER-BASE MUD	WELL D completed with WATER-BASE MUD	WELL E completed with WATER-BASE MUD
TOTAL DEPTH	4650′	4680′	4615′	4670′	4681′
CASING DIAMETER	7″ @ 4605′	5½″ @ 4680′	5½″ @ 4570′	7″ @ 4624′	5½″ @ 4650′
SAND THICKNESS (Net)	36′	27′	35′	32′	24′
CHOKE SIZE	19/64″	open 2½″ tbg.	1″ csg.	open 2½″ tbg.	——
PRODUCTION TEST	**Flowed 186 bbls. 24 hours**	**Pumped 75 bbls. 24 hours**	**Flowed 96 bbls. 24 hours**	**Flowed 92 bbls. 17 hours**	**Bailed dry**
RESULTS	No swabbing Still flowing	Well now on pump	Production decreasing	Still testing	Flows 20 B/D by heads

Compare this well completed with

BLACK MAGIC

OIL BASE DRILLING FLUID

with these 4 offsets completed with water base muds

These five wells in the East Brady field, Oklahoma, were drilled under identical conditions. The difference in elevation varied only 70 feet from the highest to the lowest. All factors affecting production are known. One well shows a much greater productivity not only at the outset but many months later. *This well was completed with Black Magic oil base drilling fluid.* It came in flowing immediately on displacement of the Black Magic with crude oil, whereas all of the water base completions had to be swabbed.

In almost every case where comparative production data is obtainable, wells drilled with Black Magic stand head and shoulders above offset wells completed with water base muds. Black Magic has a filtrate loss of zero. It cannot and will not water block or mud off the pay section. The thin mud cake deposited by Black Magic can be quickly disintegrated with crude oil thus assuring the highest return permeability possible.

Not only does Black Magic give greater production but also allows longer bit time on bottom by lubricating bit bearings and cutting heat generation. No chemicals need be added to run up the cost and Black Magic can be regenerated for use over and over again. Black Magic has been used with outstanding success on over two thousand wells. Write for the paper, "Application of Oil Base Mud in the Mid-Continent Area," by M. T. Randolph.

Black Magic is not to be confused with any other type of oil base drilling fluid and is manufactured, distributed and serviced by Oil Base, Inc., an entirely independent company. South American representative: Petro-Tech Service Co., Maracaibo, Venezuela.

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the rig floor, and oil-resistant rubber parts in the pumps considerably facilitate the handling of oil-base mud.

There are two common objections to the use of oil-base mud. First, and probably foremost, is the initial cost. It is true that the initial cost of oil-base mud is higher than that of most water-base muds, due mainly to the fact that it is compounded essentially from petroleum. Many operators overlook the fact that a good oil-base mud may be used over again with recoveries averaging around 90 per cent of the circulating volume. Thus the actual cost of the oil-base mud per well can be, and usually is, a very nominal amount. There are many cases on record in which the cost of using oil-base mud is actually less than the cost of an ordinary water-base mud.

The other point concerns the permanence of the benefits derived from an oil-base completion. Many operators are of the opinion that a higher initial productivity may be procured by drilling the pay zone with oil-base mud, but there is some question as to whether a higher ultimate recovery will be obtained. Radford states:[12] " . . . . as to the permanance of the effect, a study of wells in a certain field indicates that it extends over at least a substantial portion of the life of the well. In this field excellent information in regard to permeabilities and pressures is available for comparison of four water-base and four oil-base wells. Initial specific productivity indices for oil-base-mud wells range from 50 to 200 per cent higher than those of the clay-base wells. After a period of 6 to 7 years this relationship still exists."

There are several other fields in which 3 to 5 years' production history shows the same beneficial trend. It may be stated that although there have been no fields with oil-base completions taken to depletion, the evidence strongly indicates that a greater ultimate recovery may be expected from a well completed with oil-base mud. Likewise, the flowing life of oil-base wells should be longer and therefore the over-all production cost less.

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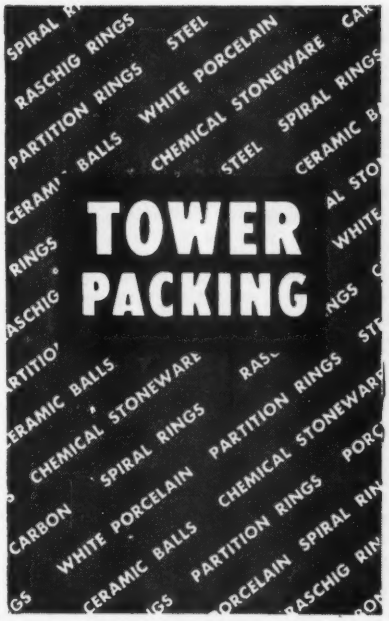
Allowable Transfer

(Continued from page 66)

producers in the field under the terms of Special Order No. 6-10,956, dated July 10, 1947. At the option of the operator, any marginal well producing 100 bbl. or more of water daily may be shut in and the oil allowable transferred to another well or wells on other leases which produce less than 25 per cent water. The same applies to any nonmarginal wells, which would be treated as if it were a marginal well, producing not over 19.99 bbl. daily.

The allowable to be transferred is based on two factors, the producing capacity of the well, and the rate of production decline in East Texas. The first factor equals daily average production over the previous 3 months, or daily producing capacity as determined by a 72-hour commission-approved test, whichever is the smaller. A maximum of 19.99 bbl. daily is allowed. If the well is making water in excess of 400 bbl. daily, its rated capacity is further reduced to that amount of oil produced with 400 bbl. of water.

As a basis for determining the declining rate of transferred allowable, the adopted "Average Oil Production Decline Curve for the East Texas Field" (Fig. 5) commonly termed the decline curve, is used. This curve represents the average decline in oil production, of a large number of East Texas wells making water. The adjusted capacity of the shutin wells is entered on the curve and transferred production begins at that rate on the first day of the next calendar month. At regular 3-month intervals thereafter, allowable is reduced by the factor 0.81325. Production continues until the rate reaches 2 bbl. daily. Two examples are cited in Fig. 5. A well allowed the maximum transferrable allowable of 19.99 bbl. daily will be granted a transferred allowable of approximately 9,000 bbl. depending on the time of year it was entered on the curve. An operator



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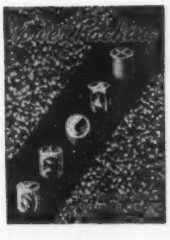

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shutting in a well with a rated capacity of 8 bbl. daily will be granted transferred allowable from another well for 21 months, totaling about 3,000 bbl.

At the end of the last 3-month period during which transferred allowable exceeds 2 bbl. daily, the shutin well may again be tested and placed back on production, but no bonus oil will be granted for salt-water injection, nor can the allowable again be transferred. In the event title to shutin wells changes hands, the new owner may continue the transferred allowable under the decline curve, or may produce the well again, without receiving bonus oil for salt water injected. No well may produce more than 6 bbl. daily of transferred allowable. Transferred allowable may not be produced by any well making more than 25 per cent water. Fig. 6 shows the approximate cumulative transferrable allowable for wells with producing capacities from 2 to 19.99 bbl. daily.

Oil Transfer Continues

To April 1, during the 9-month period in which the commission has allowed this method of allowable transfer, a total of 208 wells have been shut in. Table 1 summarizes the data on all wells shut in under Order No. 6-10,965. Not included are 10 wells similarly shut in by previous special orders. It should be noted that in nearly all cases, the rated capacity at which the shutin well was entered on the decline curve was less than the gage recorded on the 72-hour test. The average water-oil ratio of wells so shut in, to April 1 is 39.3 to 1.

Assuming the shutin wells were continued on production, following the average decline rate at constant water-oil ratios, a most conservative estimate shows that by transferring allowable, ultimate withdrawals of about 25 million barrels of water will be avoided temporarily, by action under this provision to date.

Most operators electing to shut in water wells under this provision have thus far been independents, although 27 wells owned by three major companies have been placed on the curve. Some independents without established facilities for testing wells each 6 months find it less costly to transfer allowable than to continue to produce high water wells at mounting costs. The purpose behind the provision remains one of partially offsetting mounting water withdrawal rates better to conform with injection facilities which are being augmented as materials become available. Thus, providing for a greater ratio of injected water to produced water, Order No. 6-10,865 is basically a conservation measure. It does not require the abandonment of any well whose transferred allowable has been produced.

It is of interest to note that salt-water production in the field has leveled off since last autumn. Total daily water withdrawals reported to the Railroad Commission showed 652,759 bbl. as of January 1, 1948, as compared with 652,796 on July 1, 1947. East Texas Water Disposal Co., which injects 75 per cent of all water returned to the Woodbine sand, averaged its peak daily injection of 400,000 bbl. in October and has not since equaled that rate. This is the first time since its beginning in 1942 that the company has experienced any sustained leveling off of salt-water collections from the leases it serves.

As of April 1, oil allowable transferred under the authority of the July order averaged 1,285.15 bbl. daily. The water which would have been produced with that much oil from wells now shut in is conservatively estimated at 50,500 bbl. daily. This estimate checks with the actual reductions in salt-water collections.

Continuation of the practice will allow companies engaged in expanding their injection facilities to catch up with produced volume, and maintain a high ratio of injected water. Obviously, salt-water withdrawals cannot be reduced nor held at the same continuing rate indefinitely by this means. As salt water encroaches further eastward, such allowable transfer will become less and less feasible. As a temporary measure, however, it will allow operators to maintain net water withdrawals at a practical minimum.

SO_2 Extraction Unit

(Continued from page 71)

incoming extract solution, followed by a cooler, and then passed through a caustic-treating shell and into storage.

Raffinate solution is pumped from its accumulator through heat exchange with incoming oil charge, then through heat exchange with hot oil from the raffinate vacuum evaporator. It next enters the raffinate condenser-pressure evaporator and passes through the series of evaporators in the manner described for the extract system. Oil from the raffinate vacuum reboiler exchanges heat with incoming raffinate solution, is further cooled by a water cooler, and pumped to storage.

Extract and raffinate vacuum evaporators are operated in a manner to yield products completely free of SO_2. To do this it is necessary to operate the vacuum reboilers at temperatures sufficient to boil the light front ends of the oil as an aid in stripping out SO_2. The temperature is fairly critical since too high a temperature will drive oil into the vacuum vapor trap and too low a temperature will permit the presence of SO_2 in the product.

A 3-ft.-6-in. by 28-ft. steel tower is used for air blowing the raffinate to remove the SO_2 when it appears in the stock during periods of upset. This tower has been fitted with five bubble trays and is connected to permit oil to flow down from the top against a stream of air rising from an inlet at the bottom. An air rate of 25 M.c.f. per hour will remove the SO_2 from a diesel raffinate containing up to 50 p.p.m. If the SO_2 content of the raffinate should exceed the capacity of the air blowing tower, the stream can be treated in a horizontal shell containing an ammonia solution. This treatment yields a cloudy product which requires prolonged settling to clarify and, consequently, is used only during emergencies.

Deaeration

A small amount of air enters the system occasionally and accumulates in the SO_2 vapor sections operating at condenser pressure. This air must be held at a low quantity in order to maintain condenser pressures within practical limits. Removal is effected by means of a line connected to the condenser outlet. This vent gas passes through the deaerator condenser and enters a small pot to permit liquid SO_2 to drop out and be sent to the charge chiller by a level controller. Air is released from this pot by means of a motor valve operated remotely from the control house.

The deaerator condenser shell receives liquid SO_2 from a branch in the line feeding the charge chiller. A layer of SO_2 is held by level control in this vessel and is maintained at a low temperature by being in equilibrium with vapor at reduced pressure connected directly to compressor suction. This temperature, usually about 10° F., is normally lower than that of the charge chiller because vapors from the latter vessel pass through a motor valve before entering compressor suction and are held at a higher absolute pressure.

Liquid levels in the charge chiller, deaerator condenser, and extract solution accumulator are indicated by the use of an insulated vertical column with horizontal plugs protruding through the insulation at uniform intervals. This column is attached to the vessel at top and bottom in the manner of a gage glass, and liquid SO_2 seeking its level in the column will chill the plugs causing them to frost and exhibit a visual indication of the liquid level within the shell. Liquid SO_2 is continually pumped from the deaerator condenser shell into the charge chiller to prevent any increase in the concentration of water due to vaporization of SO_2.

Air content of the vapor above the liquid in the main SO_2 collector is continuously recorded in the control house. This device operates from an instrument which transmits the differential pressure between the vapor pressure of pure SO_2 at the temperature of the main collector and the actual pressure in the main collector.

This differential represents the air content of the system and is recorded in pounds.

SO_2 Drying

Despite precautions taken to dry the charge oil stream a small amount of water enters from this source, usually at a concentration of about 100 p.p.m. Moisture also enters the system with the air which leaks in. This water is absorbed by the liquid SO_2 and would soon reach corrosive limits if it were not continuously removed. Drying is effected by use of a 26-ft. fractionating tower. As was mentioned earlier, the drier is fed by diverting the SO_2 vapor stream from the condenser pressure line. SO_2 vapor enters the drier near the bottom above a short section packed with 1-in. Raschig rings. A comparatively high reflux rate is used, and the SO_2 vapor is fractionated out of the water and passes from the top of the drier into the condenser-pressure vapor line. A level of water collects in the reboiler which is held at a temperature sufficiently low to minimize vaporization of water. Water is drained to the sewer from the reboiler to hold the level within designated limits. Some SO_2 remains dissolved in the water, but the loss from this source is small.

This method of drying is very effective, resulting in a usual content of .03 per cent (wt.) in the liquid SO_2 feed to the system. This is quite low in view of the fact that the safe upper limit is considered to be 0.1 per cent (wt.). A simple method of test, similar to that used by other West Coast refineries, is used to determine the water content of the SO_2. In this test, 500 cc. of liquid SO_2 is measured into a liter flask fitted with a calibrated tip. The SO_2 is permitted to evaporate, leaving the water behind in the tip where its volume can easily be measured and converted to per cent. The Karl Fischer method has been used by the laboratory to check the plant test, and conclusions drawn from these comparisons are that the plant test is sufficiently reliable for control.

Switching Stocks

Both diesel-oil and kerosine stocks have been run in the unit to date, the process of switching from one stock to the other having been effected smoothly. The chief operational changes to be made during such a switch are treating temperature, ratio of SO_2 contact, reboiler temperatures, and evaporator pressures. During these periods the unit is kept running at a uniform charge rate, and oil levels in the sand filter and vacuum deaerator are lowered.

The new stock is then cut in and allowed to flow through the unit displacing the previous stock. A time schedule is employed to make control changes at various points in the system at the approximate moment the new stock appears. For example, in switching from diesel oil to kerosine the treating temperature should be reduced only after the diesel oil has been displaced to avoid getting close to the pour point of the diesel. At the time the kerosine reaches the vacuum reboilers the absolute pressure on this equipment must be increased from 60 to 190 mm. Hg to avoid flooding the towers. Similar considerations must be employed when going from kerosine to diesel stock.

Diesel oil from the SO_2 plant is sent directly to storage ready for marketing, but kerosine raffinate requires further treatment. This product meets all specifications except the lamp test and is sent to the acid-treating section of the refinery where it is given treatment with 98 per cent sulfuric acid. The lamp test is thus improved, and the finished product meets superior grade kerosine specifications.

Modern Features

The unit embodies latest features in SO_2 extraction plant design. In contrast to early plants using shell-type evaporators, the General Petroleum unit uses fractionation towers equipped with bubble trays for the purpose of recovering SO_2 from product streams. SO_2 drying by use of concentrated sulfuric acid has been used by many plants since the inception of the process, but the more modern method of bubble tower drying is used in this plant because of its simplicity and trouble-free operation. Lines, shells, and towers in the plant are of carbon steel with the exception of the drier, lead lined upper section of the extract low pressure evaporator, and lead lined sump tank. All valves in service where SO_2 may be present are trimmed with stainless steel.

Evacuation lines are connected to vessels and lines in SO_2 service and lead to a manifold which permits suction through SO_2 compressors and vacuum pumps or entry into a sump tank which can be evacuated by means of electric pump. Drain lines from vessels and lines are also connected to the sump tank which can be drained to the sewer, or the contents can be transferred by pressure into the extract low-pressure evaporator if dry oil or SO_2 is present.

Flushing oil is used on glands of liquid SO_2 pumps, extract solution pumps, and raffinate solution pumps. Purge oil is applied to the SO_2 flow controller, treating tower interface level recorder, and drier feed-rate recorder. Fischer & Porter rotameters coupled with indicating transmitters and receiver recorders are used for controlling reflux streams. This system has proven very satisfactory for handling small streams which are likely to cover a wide range of rate due to changes in operating conditions.

An emergency shutdown valve operated from the control house performs the function of shutting off the high-pressure steam to all reboilers, closes off the makeup-steam control to the exhaust-steam line, opens the exhaust-steam line to the atmosphere, and closes motor valves controlling oil and SO_2 charge rates. In the event of a sudden necessity for shutting the unit down this provides a convenient means of control. It is also useful for planned shutdowns under some conditions.

Cooling water is furnished from an induced-draft tower equipped with a temperature regulator operating a bypass on the return stream. Normally an electric-driven pump is used for circulation of cooling water. A steam-turbine-driven pump is always ready as a spare and will start automatically, simultaneously sounding an alarm, in the event of failure of the main pump.

Lines, vessels, and exchangers handling cold oil or SO_2 are insulated with from 2 to 4 in. of vegetable cork. Pumps in this service are insulated with a cork box filled with granulated cork and wax. Equipment in hot service is insulated with an 85 per cent magnesia coating. Towers, lines, and tanks are painted with aluminum. The control house interior is finished with green tile to a height of four feet around the walls. A section separate from the control board houses a wardrobe for operator's clothing.

In the startup of the unit the equipment was first pressure tested with oil and then subjected to drying procedures. Drying of all vessels and lines was effected by circulation with hot oil, followed by operation of the unit using isobutane in place of SO_2. The isobutane and oil were then removed and the entire unit evacuated. SO_2 was then delivered and actual treating operations commenced. Among points indicating efficiency of the operation is that an average of only 0.14 lb. SO_2 per barrel of charge oil has been consumed, which is among the lowest in the industry.

BOOKS

THE GENIUS OF INDUSTRIAL RESEARCH. By David H. Killeffer. Published by Reinhold Publishing Corp., 330 West 42nd Street, New York. 263 pp. $4.50.

This treatment of modern industrial research and its methods is intended primarily to guide the ambitious young researcher to a better understanding and a surer mastery of his craft. The material presented is mostly from the field of industrial chemistry. The fascinating accounts of how many important modern developments were achieved are quoted directly from original presentations of those responsible—a method adopted to give the reader a clear insight into the reasoning behind these researches. The point of view throughout is that of the individual researcher and not that of management or direction. Described at length are the research methods which produced high-octane gasoline, the gas-filled tungsten-filament electric lamp, celluloid, the first synthetic plastic, and many others.

PLANT PRACTICES

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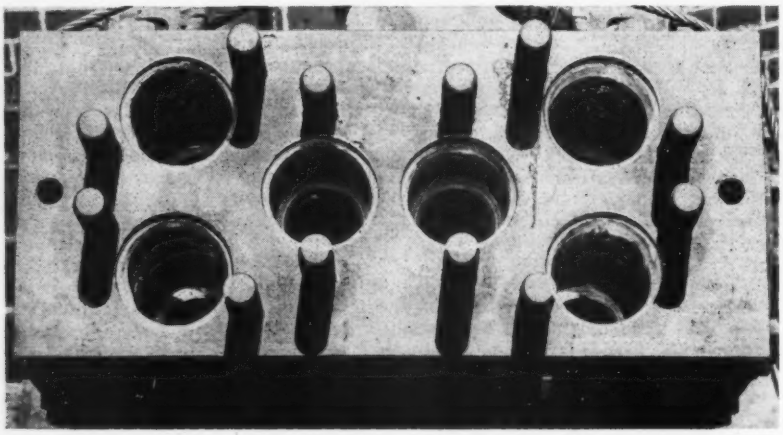


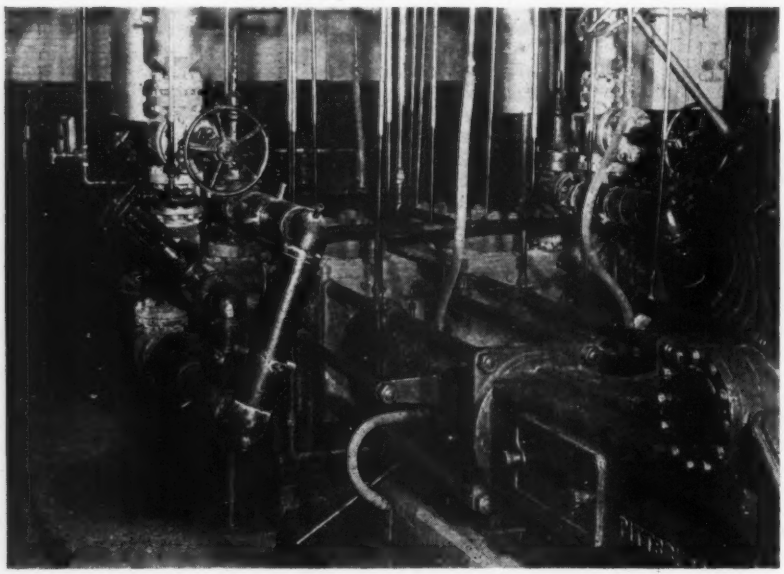
Repair of Forged-Steel Hot-Oil Charge Pump Block

By GILBERT CORBIN
Heath Refinery, Newark, Ohio

SOME time ago corrosion of a forged-steel pump block at one of the main charge pumps at Heath refinery had corroded to such an extent that repairs or replacement became necessary. Delivery on these forgings would have taken so much time that it was decided to repair the pump by means of lining the interior of the pump with alloy.

The pump was disassembled and the block removed to the shop and thoroughly cleaned by a combination of methods. The studs were taken from the pump blocks so as to remove as much as possible all obstructions interfering with welding.

The valve passageways as well as the interior of the pump were lined with 12-gage type 410 stainless steel. Fabrication of the material was performed to as great an extent as possible before placing it in the pump where it was finally welded into place thoroughly attaching it to the various sections of the pump.



At some rather intricate intersections it was found more feasible to build up an entire area, wash welding with alloy welding rod instead of trying to fabricate the sheet. Coated welding rod of 18 per cent chromium, 8 per cent nickel were used in this job.

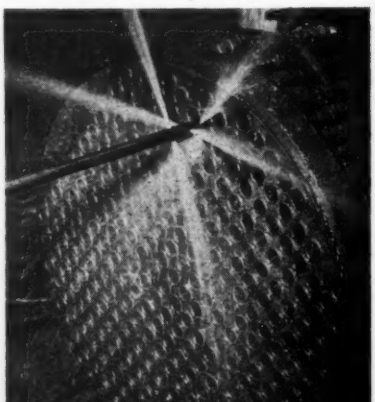
The particular pump has been in service approximately 4 years since the repair was performed, and the success of the method has been proven by freedom from any defects or breaking away of the liner from the pump. The accompanying photographs show the pump as stripped for welding and also in place after repair.

Heat-Exchanger Tube Cleaner

By M. A. FURTH
Smiths Bluff Refinery, Nederland, Tex.

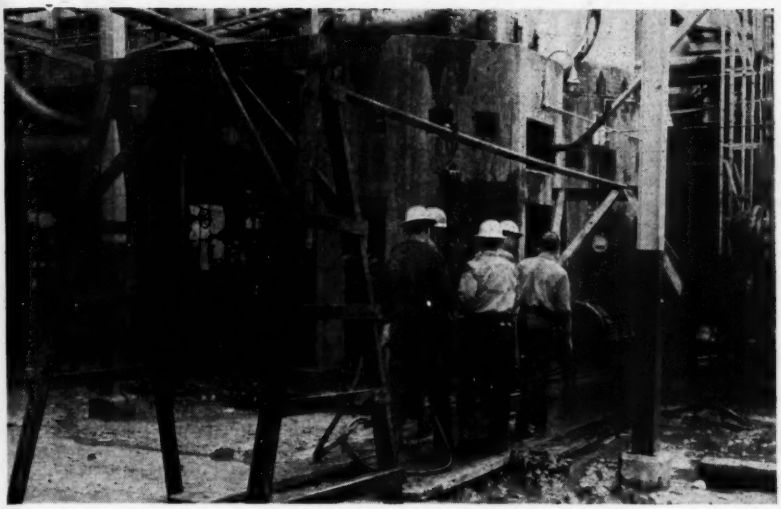
THE cleaning of hard deposits from heat-exchanger tubes has always been a difficult problem, particularly when some tubes are entirely plugged by deposit.

The tool was designed with the view of more thorough and rapid cleaning plus eliminating dangers of cutting the tube being cleaned. The front end (1) of the tool is formed and ground similar to a drill, the taper portion (2) constitutes a reamer while the back portion (3) of the tool has parallel cutting edges of a diameter equal to the tube inside



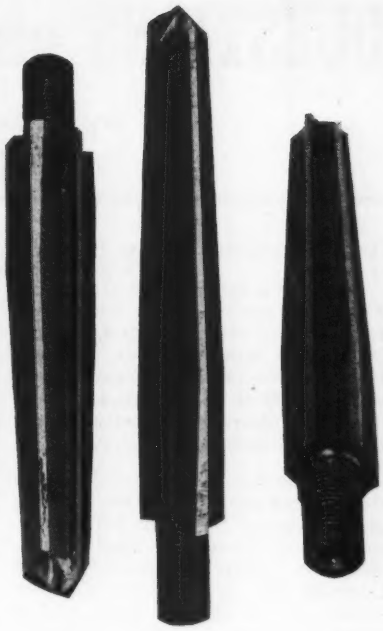
diameter. With this design the cleaner is guided so as to minimize danger of cutting a tube.

The tube is provided with means for introducing coolant, solvent, and flushing liquids. Six small holes are drilled toward the hollow center and various flushing agents such as hot water, solvents, or cleaning compounds are introduced by pumping through the hollow drill stem used



for revolving the cutting tool. The cutter is heat-treated high-speed steel.

The tool is driven by a low-speed air motor such as the Airtool CC-350 or equivalent. The hollow shafting between the motor and tool is either 7/16 or ½ in. carbon steel tubing with a wall thickness of approximately 1/8 in. The motor and extended shafting is supported from a trolley running on a tubular hole supported at each end by two A-frames.



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Emergency Safety Slides For Tall Structures

By R. P. WOOD

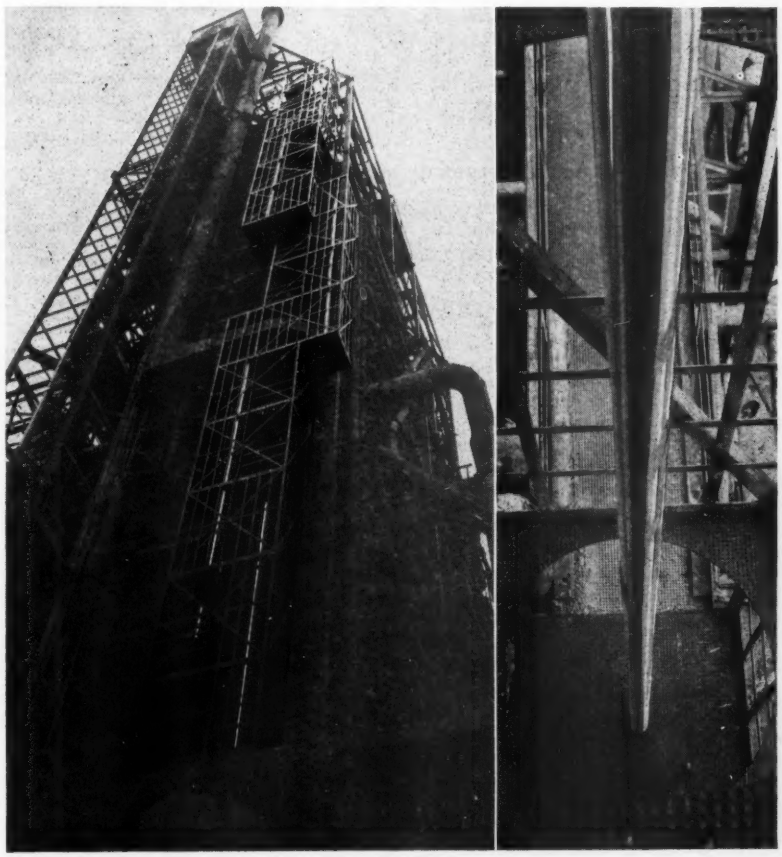
Smiths Bluff Refinery, Nederland, Tex.

THERE has always been a difficult problem to solve in connection with alternate methods of escape from tall structures such as represented by catalytic cracking units. This subject was solved in a satisfactory manner at the Smiths Bluff refinery by providing safety slide poles on the north and south side of the unit. These devices supplement a power elevator and fixed stairways which run from the top to the bottom of the structure.

The two photographs show the construction used. Each section of slide pole is approximately 38 ft. long. The group of slide poles on one side of the structure has a total height of 178 ft. while on the opposite side the total height is 191 ft. Safety cages are provided around the entire structure, and it is possible to get on or off of a pole at each platform level. In order to be assured of safety of the pole itself, stainless steel of type 304 was used, the material being seamless tubing.

Each section of pole is suspended in a special flange and welded at its top extremity. The bottom of the pole is centered in a special socket, but is not rigidly attached by welding or other means so as to permit free expansion of the pole. Freedom from rusting was assured by virtue of the stainless construction.

Testifying to the efficacy of these slide devices, men have shown preference for the use of these poles over the stairways during cleanout periods when necessary to descend from the structure. From a safety angle, the distribution of the methods of escape seems to provide adequate, quick means of escape from any particular level of the structure.



QUESTIONS on TECHNOLOGY

by W. L. Nelson

Consulting Engineer

Reciprocating Pump Speed

We have a general rule around the plant that the maximum design piston speed of steam pump should be 30 ft. per minute. Your Refiner's Notebook No. 143 shows piston speeds as high as 80 ft. per minute and nothing is said about this—whether or not it is a maximum value.—J. A. C.

The tabulation of reciprocating steam pump sizes, capacities, working pressure, pump speed, discharge pressures, steam required, and weight, shown in Refiner's Notebook No. 143 (May 10, 1947, p. 99) is based almost totally on the recommendations of pump manufacturers. This raises the old controversy between manufacturers and plant operators concerning the design of such equipment. Obviously the manufacturers wish to claim as large a capacity as possible, or stated in reverse, they wish to offer a cheap pump. As against this, the operator and maintenance man has discovered that repairs, leaks, etc., can be avoided by using low pump speeds. This practical experience is summarized in Refiner's Notebook No. 144 (May 17, 1947, p. 113) which shows (See Table 1) the general range of pump or piston speeds for different lengths of stroke.

TABLE 1—PISTON SPEEDS OF RECIPROCATING STEAM PUMPS

Stroke, inches	Piston speed, ft. per minute — Recommended speeds	Some manufacturers' maximums	Recommended No. of strokes per minute
3	15-30	36-46	60-120
4	17-35	35-44	51-105
5	20-40	24-39	48- 96
6	22-45	27-52	44- 90
8	27-55	32-46	40- 82
10	31-63	60-75	37- 75
12	35-70	80	35- 70

The lowest speeds are for viscous oils and the highest speeds are for cold water. Although the difference between the manufacturers' ratings and the practical speeds is great, the manufacturers can hardly be expected to rate their equipment at the lowest speeds, particularly since the pumps can for short times under emergency conditions be operated at speeds well above the maximums listed.

Although operators desire extremely low piston speeds, little is found in the literature because practical men are seldom inclined toward writing and because their type of article is dull to all readers except those few people who are equally experienced. Perhaps the two most practical articles in the literature with respect to pump speed are (1) L. D. Wyant, "Refinery Pump Selections," Ref. Nat. Gaso. Mfr., Feb. 1935, p. 53 and (2) H. P. Henderson, "The Reciprocating Steam Pump in the Natural Gasoline Plant," Calif. Nat. Gaso. Assoc., April 1943, and even these references present only a few paragraphs on the subject of pump speed.

High-Speed Disadvantages

The disadvantages of a high pump speed are fundamentally dependent upon the acceleration of the fluid and mechanism that must occur at each stroke of the piston. Thus, at each reversal of the piston the momentum of the piston assembly, the fluid in the cylinder and to a large extent all of the fluid in the line must be accelerated from zero up to the maximum speed or rate of flow. The time during which this acceleration occurs cannot be stated exactly but in general the momentum tends to increase fourfold when the piston speed is doubled. The increase is fourfold because not only is the speed doubled but the quantity of fluid handled tends to be doubled. Thus, the tendency toward water hammer, jarring of instruments, vibration of pipe lines, valves, ports, and lines, increases sharply with speed.

It is also evident that long-stroke pumps are superior with respect to the situation just described because the number of strokes or times that reversal occurs is in some respects more important than the speed attained. In general, revolutions per minute or strokes per minute are more significant than piston speed because they measure the reversals as well as the speed. Note in Table 1 that the recommended number of strokes is greater for slow speed pumps than for high piston-speed pumps. F. B. Applegate (Reciprocating Hot Oil Pump, Trans. A.S.M.E. 1930, P.M.E. p. 83) recommends 18 frictional pull on the packing, and even friction losses through the r.p.m. for large hot-oil high-pressure pumps driven by steam cylinders. This gives the following piston speeds:

	ft./min.
24-in. stroke	72
18-in. stroke	54
12-in. stroke	36

If such pumps are engine driven, higher speeds can be used but the port or valve areas must be adequate.

High speeds also tend to cause loss of suction, particularly with volatile or hot liquids and hence lower speeds should be used. Thus, Henderson recommends speeds nearly the same as those of Table 1 for nonviscous oils or water (below 250 S.S.U.) but 10 to 50 per cent lower for volatile liquids even when the pump has been designed for their handling by the use of large ports set directly in the side of the pump cylinder. If vaporization occurs in the suction line, hammering occurs and the capacity may drop off even though the speed is greater. The Standard Oil Co. of New Jersey (Preventative Maintenance Program . . ., Nat. Pet. News, Tech. Sect. Aug. 2, 1944, p. 55) also emphasizes the loss of steam that may occur by failure of the steam cylinder to be completely filled and emptied at high speeds. Overspeeding wastes steam as follows:

	R.p.m.	Flow, g.p.h.	Steam per 100 gal.
Normal operation	48	2,800	3.6
Overspeeding	60	3,200	10.9

L. D. Wyant's ideas of pump speed are—"There are few greater items of expense than those resulting from overspeeding. . . . The damage resulting from overspeeding piston-type pumps comes from hammering of valves when the piston reverses direction in a partially filled cylinder. This hammering will result in ruined valves or line leaks very quickly. When a pump is started into operation it should be started slowly and its speed increased gradually as the fluid in the line has time to increase in velocity."

He also feels that the length of stroke should be twice the diameter of the fluid cylinder because short-stroke pumps do not fill completely particularly if suction lift is required. In addition, the stuffing boxes should be deep. Shallow glands must not be pulled up so tightly that scoring of the rod occurs and the packing loses its resiliency or ability to adjust itself to the size of the rod. F. B. Applegate (Pump That Obtains Low Volumetric Clearance. . ., *The Oil and Gas Journal, September 22, 1932, p. 123)* recommends a minimum stuffing box length of 6¾ to 7¾ in. G. Vandenberg (Hot Oil Pumping Problems. . . . Vacuum and High Pressure, Ref. Nat. Gaso. Mfr., Dec. 1932, p. 593) recommends long-stroke pumps, particularly for vacuum service.

JOURNAL-*Guide* TO

Shafter Lake Devonian

Andrews County, Texas

WHILE not the most active field in the Texas Permian basin, Shafter Lake Devonian commands top interest among producing companies. At this time there are nine rigs running and two locations.

Pays.—Main pay of the field is in Devonian, around 9,500-10,000 ft. A second pay is the Wolfcamp, lower Permian, above 4,000 ft. Three wells offsetting the discovery have been dually completed, from the Wolfcamp and the Devonian. There are no completions in the Wolfcamp alone and spacing is 40 acres for Devonian production. So far, no Ellenburger tests have been made in the area, although some operators are of the opinion that Ellenburger wells recently brought in, to the northwest in the Fullerton area, might prove a northwest-southeast trend to connect the two fields.

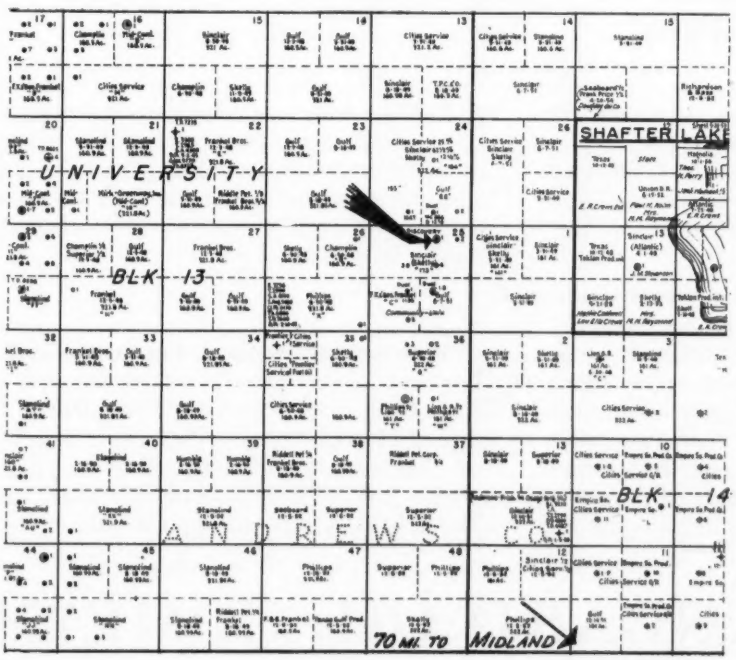
Casing and bits.—Standard casing pattern is 13⅜-in. to 300 ft., with 250 sacks; 9⅝-in. to 4,100 ft., with approximately 1,500 sacks, and 7-in. to total depth, requiring an average of 750 sacks. Aquagel and quebracho are used for mud control. No special mud problems have been met and conditions are termed "average" and similar to wells in the Fullerton area. Rock bits are used throughout, from the 17½-in. surface bit, (usually one), to an average of 15 12¼-in. bits used to set casing to 4,100 ft., and about 75 bits of 8¾-in. size to total depth.

Contract terms.—Contracts are let on a footage basis, plus day work, with the operator preparing location, supplying water, paying for mud, and supplying cement. Water is abundant from wells, but requires a depth of around 1,500 ft.; otherwise it must be brought in a considerable distance from Fullerton field. The contractor supplies the substructure and derrick. Power rigs are used, and local gas supply is sufficient for drilling.

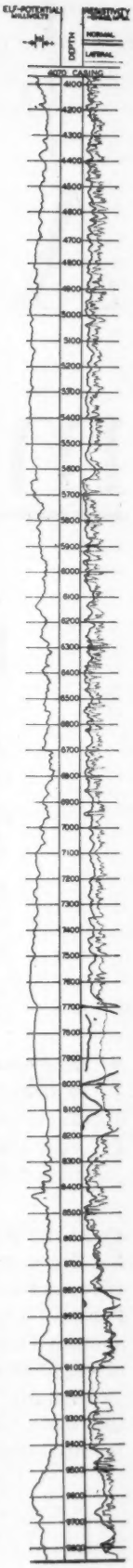
Drilling conditions.—No special drilling problems have been encountered; there are no high-pressure water flows, lost circulation, nor heaving and caving shale. In general, it is considered just average hard drilling, using one rock bit a day. Gas is encountered in the Yates sand, around 2,800 ft., and pressure runs to 2,000 psi., relatively high for the shallow depth.

Average well time is 93 to 95 days, broken down into: Rigging up 3 to 4 days; actual drilling time (bit on bottom), 75 days; running casing and waiting on cement, 7 to 8 days. All other time, including coring and logging, 10 days.

Companies.—Sinclair Prairie Oil Co. is the principal operator at this time, with four rigs running. Other companies drilling or owning acreage include Skelly Oil Co., Gulf Oil Corp., Cities Service Oil Co., Frankel Brothers, Phillips Petroleum Co., Lion Oil Co., and Superior Oil Corp.



Nine rigs are now running at Shafter Lake, drilling to the Devonian at 9,500-10,000 ft. Some dual completions are made in the Wolfcamp, lower Permian. Electric log is of the discovery well. (Map courtesy Southwest Mapping Co., Fort Worth)



The better you live, the more oil you need...

A report on the most useful year

IN this country and through the world, human progress calls for more and more oil. To do their part in meeting the great need for oil in 1947, Standard Oil Company (New Jersey) and its affiliates performed the biggest job in their history. They produced more oil and delivered more products; took in and paid out more money; employed more workers and served more people than ever before. And far more than ever was spent for facilities to meet growing needs—426 million dollars in a single year, paid for out of past and current earnings of the business. It was a year of great accomplishment; great progress. Here are some highlights from this significant year, based on the Company's Annual Report to its 171,000 stockholders...

1 **World-wide, the need for oil surpassed all records.** To help meet the need, crude oil production by Jersey Company affiliates was increased 8% over 1946, setting another new record. Their production was 14% of the world's total for the year.

2 **In the U.S., too, the need was at record levels.** Three million more cars to fuel than pre-war; twice as many tractors and trucks on farms; a million and a half more oil-heated homes; five times as many diesel locomotives. Total U.S. consumption of oil products was 11% greater than 1946, 12% greater even than the peak war year. In meeting this need, we set new output records month after month, accounting for 9% of U.S. total crude oil.

3 **The unusually hard winter** made heating oil and kerosene supply a special problem. By extraordinary effort in refineries and hard work and long hours by people all along the line, we were able to deliver about 25% more of these products than in the winter before.

4 **With such big demand, big supply, and rising prices,** money came in — and was paid out — in all-time record figures. Total dollar income reached $2,387,000,000 — 45% over 1946. Operating charges and other deductions from income reached $2,118,040,000 — 44% over 1946. A record sum of $466,954,000 was paid to our employees.

STANDARD OIL COMPANY
AND AFFILIATED

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Retiring Thickness

(1 and 4-In. Pipe)

BASIS—GRADE A SEAMLESS STEEL PIPE (BUT A STRESS VALUE "S" OF 12,000 AT 750° F.)

$$t_m = \frac{PD}{2S} + C$$

t_m = minimum thickness, in.

P = internal minus external pressure, psia.

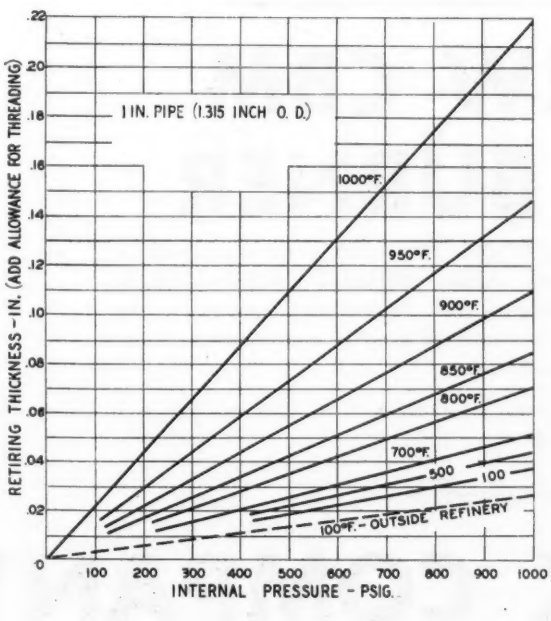
D = actual outside diameter, in.

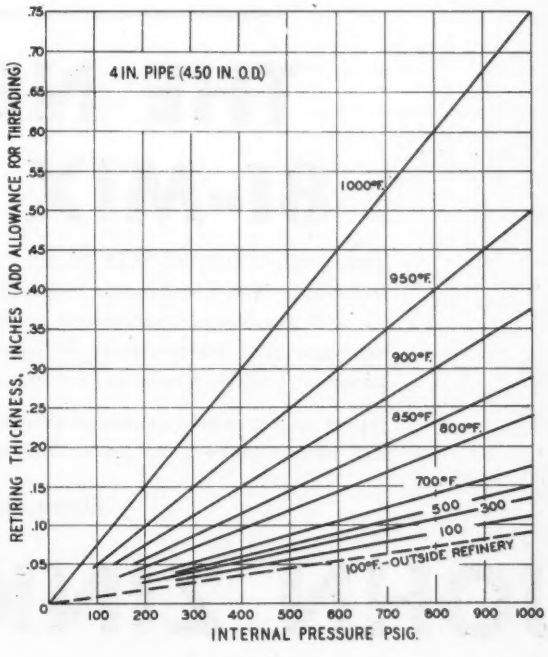
S = allowable metal stress, psi. (see tabulation of materials)

C = allowance for threading, welding, mechanical strength and/or corrosion

Values of C		Other materials	Specification	Multiplier for thickness
Welding	0.05	Grade A seamless	A.S.T.M.-106 A.P.I.-5L	1.0
		Grade B seamless	A.S.T.M.-106	.77
Pipe threads		Grade B seamless	A.P.I.-5L	.80
⅛-in.	0.03	Grade C seamless	A.S.T.M.-106, A.P.I.-5L	.64
¼-⅜-in.	0.044	Lap welded	A.S.T.M.-53, A.P.I.-5L	1.33
½-¾-in.	0.057	Butt welded	A.S.T.M.-53, A.P.I.-5L	1.60
½-in.	0.07			
2-in. up	0.10			

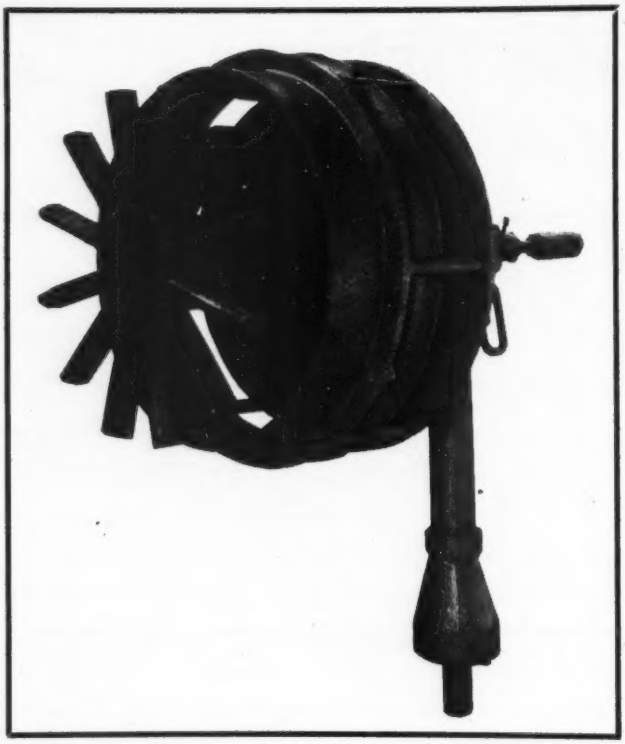
Refer to Refiner's Notebook No. 192 (Inspection), April 15, 1948, and a correction of Table 2 which appeared May 13, 1948, for a discussion of A.S.A. Code for Refinery and Gasoline Plant Piping, the effect of temperature, etc.





No. 198 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

JOHN ZINK BURNERS



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The John Zink BI-MIX GAS BURNER has been combined with a Steamizer type Oil Burner to produce a highly efficient COMBINATION oil and gas burner identified as Series CBM. It provides approximately the same heat pattern when firing either or both fuels in combination. Uses steam or high pressure gas for oil atomization.

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ENGINEERING *fundamentals*

Material Balance Principles

TWO of the basic principles utilized in all engineering work are the law of conservation of mass and the law of conservation of energy. Every engineer is familiar with these principles in one form or another. Using an elementary case, for example, we know that if two separate weights of a substance are combined, the total weight is the sum of the individual weights. Or again, the principles of thermodynamics require that the total energy change in a process will show up either as a heat change or a work change.

Most natural processes can be broken down into separate unit steps within each of which steps a balance can be made, either upon the amounts of material concerned or upon the amounts of energy concerned. Thus, in the processing of a wet gas, a liquid gasoline fraction and a dry gas are the end products. For this process, a balance can be made merely by stating that the weight of wet gas supplied to the unit in an interval of time must equal the weight of the dry-gas residue plus the weight of the liquid gasoline removed from the unit in the same time interval. Since any of these weights can be expressed as a product of a volume and a density, the expression for such a balance becomes

Wt. wet gas into process = wt. dry gas residue + wt. gasoline produced (1)

Volume wet gas × density wet gas = volume dry gas × density dry gas + volume gasoline × density of gasoline (1a)

In stating the above balance, it is inherent that the units of measurement are the same. Pounds are equated to pounds or grams to grams. Therefore, the density units must be such as to produce the desired weight units. It is immaterial whether volume of gasoline is expressed as cubic feet or gallons so long as densities are correspondingly pounds per cubic foot or pounds per gallon.

Another characteristic required when striking a balance is that any definable fraction of the total must also be balanced. Thus, considering the same process as above, the wet gas, dry gas, and gasoline each include many individual components, i.e. methane, ethane, etc. A balance must hold for each of these. Taking methane, for example, as a definable fraction of the total, the following must be true:

Wt. of methane in wet gas = wt. of methane in residue gas + wt. methane in gasoline produced (2)

Vol. methane in wet gas × density methane = Vol. methane in a residue gas × density of methane + Vol. methane in gasoline × density of methane (2a)

Again it is immaterial how the volumes or densities are expressed so long as the product gives the same unit of weight in each case.

Complexity of Definition

Although all balances may be simply stated in such general terms as "the weight of material into the process equals the weight of the material leaving the process," the definition of each of these weights in terms of measurable quantities may become quite complex. This depends upon the number of variables that affect the process and the number of subprocesses that may be occurring and the manner in which they are interconnected.

A more detailed balance than the one given above would be written for the lifting of oil from a well by means of a gas which is introduced as a dry gas. Consider that an oil which is pumped as a 42° A.P.I. oil becomes a 40° A.P.I. oil in the stock tank when lifted by dry gas because of lighter components taken up by the dry gas during the lifting process. For every barrel of 42° oil which might have been pumped, there will be less than a barrel of 40° oil lifted by gas because of the material lost to the gas. In this case, the balance on weights of material is represented by the two equations:

Wt. of 42° A.P.I. oil = Wt. of 40° A.P.I. oil + wt. of components added to dry gas (3)

Wt. of gas after lift = Wt. of dry gas before lift + wt. of components added to dry gas (4)

In these equations, it is understood that the weights of gas and oil all represent the same interval of the process. In this case, perhaps the simplest reference point to choose so that the quantities are consistent is to choose everything standard to 1 bbl. of 40° A.P.I. oil produced. Thus, the volume of 42° A.P.I. oil involved will be more than 1 bbl. by the liquid volume represented by the components added to the gas, and the quantities of gas will be those injected and produced with 1 bbl. of 40° oil.

Weight Calculation

In this instance any one of the two oil weights or gas weights can be calculated if the other three are known. Furthermore, the problem can be put on a volume basis if the densities are included. It would become more complex to state a balance for this problem if it were considered that the weight of gas after lifing included not only that introduced as dry gas plus those components removed in reducing the oil from 42° to 40° gravity but also that gas which would ordinarily be in solution and be produced along with either the 42° oil or the 40° oil. To include this, one would need to introduce a third equation expressing the amount of gas in solution per barrel of 42° A.P.I. oil produced.

These principles of applying the conservation of mass can be utilized in many phases of petroleum engineering, particularly where changes in fluid character are concerned. For example, on a gas reservoir the use of Boyle's law for predicting reserves *(Engineering Fundamentals No. 304)* is an amplification of the following balance:

Wt. of gas originally in reservoir = Wt. of gas produced + Wt. of gas remaining in reservoir. (5)

Series prepared by Dr. John C. Calhoun, Jr., Petroleum Engineering School, University of Oklahoma

View of Oceco 3" Screwed Connection Vent Valve with Flame Snuffer and Chain.

View of Oceco 6" Flanged Connection Vent Valve showing mounting on Oceco Flame Arrestor.

● Oceco Vent Valves provide positive and dependable control of tank breathing. They prevent the free discharge of vaporized liquids resulting from fluctuations in temperature,—and restrict tank breathing, resulting from pumping into a tank. They avoid any serious lowering of gravity ratings;—retard the formation of gum;—and avoid "cave-ins" and "blow-outs" resulting from excessive vacuum and pressure.

These valves combine the advantage of our twenty five years of experience in meeting the industry's most exacting requirements;—and the results of exhaustive tests conducted in our laboratories. The Venturi effect of the body gives the valves even greater pressure capacity than an open nipple, while the spacing and design of the openings provides large vacuum relief. The drip edges on the valves carry away any condensate, thus protecting the valves against corrosion and freezing, and the stem guided construction prevents sticking and "cocking."

The housings are semi-steel castings that can withstand direct exposure to flames for long periods of time, and consequently provide a solid support for the valves, valve guides and seats, keeping them in proper alignment and assuring tight closure at all times.

Furnished in 2" and 3" sizes for screw mounting, and 4", 6", 8", 10" and 12" sizes for flange mounting, either as individual units or complete with an Oceco Flame Arrestor. Prices and a fully descriptive bulletin sent promptly on request.

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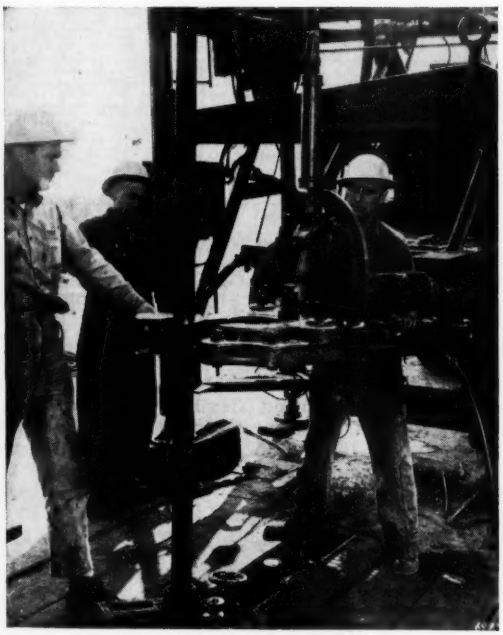
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by John M. Spears

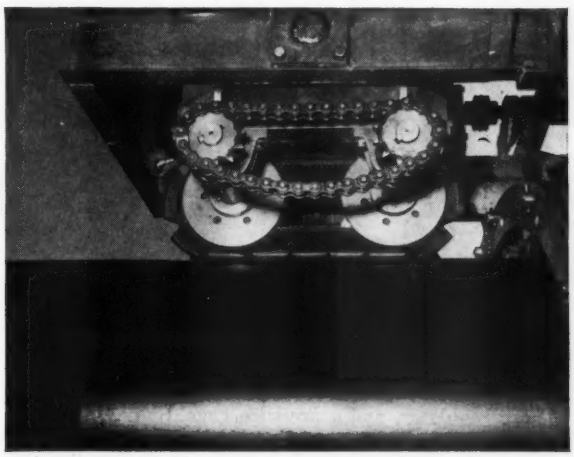
(1) NEW TUBING TONG is for production and workover crews. Designed for making up and breaking out tubing and light drill-pipe joints, new tool reduces heavy, tiring work with conventional hand tools. Driven by a 5.3 hp. vane-type air motor, tong operates in high



gear at 60 r.p.m. and supplies 1,062 ft.-lb. stalling torque; operates in low gear at 16 r.p.m. and develops a stalling torque of 4,000 lb. These high rotating speeds and increased torque values make tighter joints. Automatic features of the new tool give the operator over-all advantages in time saved, better teamwork, and greater crew safety. A ring positioning valve and cam provide automatic alignment for instant stabbing or removal from the tubing. *Byron Jackson Co.*

IT'S NEW CHECK IT

(2) NEW RUBBER TREAD for pipe-cleaning machine assures positive traction by approximately 200 in. of rubber bearing surface. No scoring of the pipe can occur. There is no metal contact with pipe and any possibility of metal crawlers indenting the pipe wall and lowering its pressure strength is eliminated. Also eliminates "burrs" caused by metal crawler wheels. Tread assists in balanc-



ing the machine on the pipe due to wide tread of tractor member. Greater bearing surface eliminates "flattening" or deformation of thin-walled pipe due to concentrated weight of machine on small bearing surface of metal crawler wheels. There is no side adjustment of crawler wheels on various diameters of pipe—one tread belt covers all diameters 6 to 14 in.; larger tread belt 16 to 26 in. *Perrault Brothers, Inc.*

IT'S NEW CHECK IT

(3) POWER SWIVELS for all types of light rotary operation eliminate the necessity of moving in kellys, rotary tables, or heavy equipment for light, short-time rotary work. They eliminate the inefficiency and danger of rotating strings by hand. Also provide the driving power for internal cutting of casing, drill pipe, and tubing; for drilling out cement following squeeze jobs; for backing

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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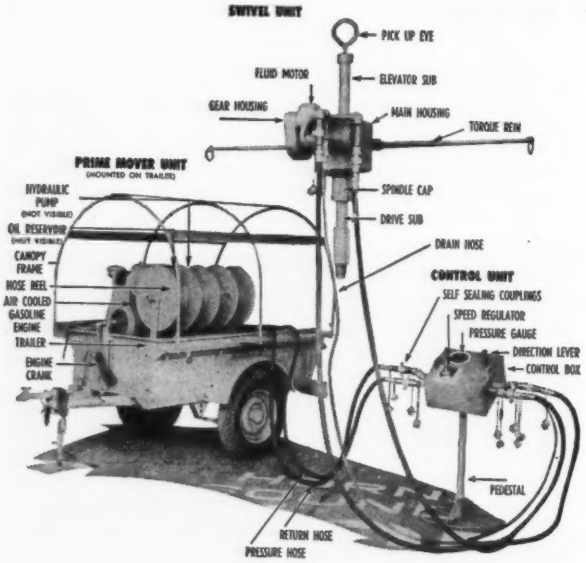
off sucker rods and tubing; for scraping liners, etc. Swivels consist of a prime-mover unit, a control unit, and a swivel unit connected by hydraulic hoses. Prime-mover unit consists of an air-cooled gasoline engine coupled through a gear reduction to a hydraulic pump—both mounted above an oil reservoir. Hydraulic pump is



provided with a relief valve to protect the entire assembly from overloading. Control unit consists of a pedestal and a control box within which are located a direction lever, a speed regulator, and a pressure gage. Swivel unit consists of a fluid motor coupled through gear reductions to a drive sub. An elevator sub is provided so that the unit may be easily suspended in the derrick. Hoses are in 50-ft. lengths to permit operation of the swivel unit high in the derrick and to permit location of the gasoline engine at a safe distance from any danger area. *S. R. Bowen Co.*

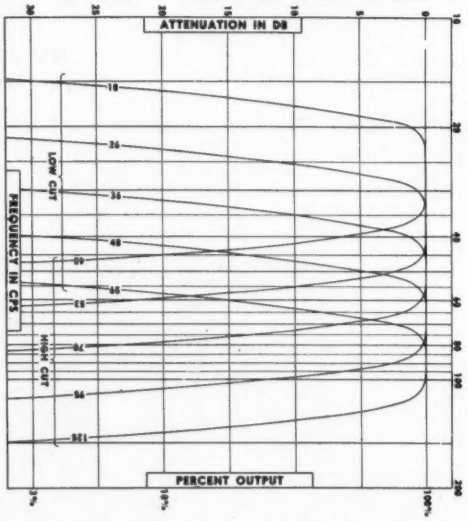
IT'S NEW CHECK IT

(4) ELECTRIC CLOCK is for use in hazardous locations where explosive atmospheres are encountered. Appearance of clock is similar to the usual electric wall clock. It has a 13-in. dial, an outside diameter of 17 in., a sweep second hand, and an external setting knob. Clock is constructed in accordance with the requirements of Underwriters' Laboratories for devices intended for use in locations where the atmosphere is hazardous

because of the presence of flammable gases or vapors. *Crouse-Hinds Co.*

IT'S NEW CHECK IT

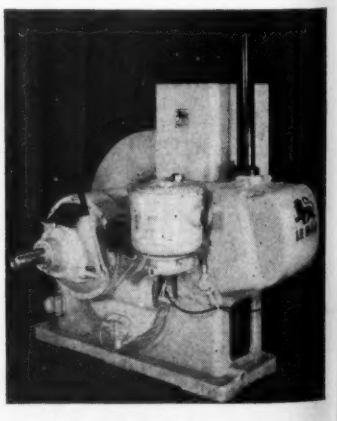
(5) NEW ELECTRONIC FILTER is for use in seismic exploration equipment. Filter, Type K-2, is available for installation in existing or new designs, or may be had as standard equipment in manufacturer's Series 4100 amplifier. Typical amplitude response characteristics are shown in the curves illustrated. Filter comes in two



units, a high cut and a low cut. Each unit consists of a can, 3¾ in. deep by 2 in. wide by 2¼ in. high, with a cutoff selector switch attached by a flexible cable. Switch and can together weigh only 1½ lb. Switch measures 2⅛ by 1¾ in. and extends roughly 1¾ in. back from the mounting panel. Mounting flexibility is provided by cable arrangements. All components except the switch are contained in the can. Filter is the passive type—there being no vacuum tubes, power consumption, nonlinear devices, or null circuits involved. In use, there is nothing in the way of close balances or critical adjustments to be disturbed nor spurious oscillations to appear. *Geotronic Laboratories, Inc.*

IT'S NEW CHECK IT

(6) NEW OIL-WELL PUMPING ENGINE has a 7¼-in. bore and 7-in. stroke and speed range from 360 to 720 r.p.m. Unit has an A.P.I. horsepower rating of 8 to above 17, maximum 13 to 26. It is entirely self-contained and fully enclosed to fit to pumping jacks without the need for housing or guard rails. It runs in all kinds of weather with little or no attention or servicing. Liquid cooled, its cooling system is patented, closed "vaporizing-condensing" cycle with air flow through condenser core created by an integral centrifugal fan that also serves as the flywheel. Every moving part is lubricated from the



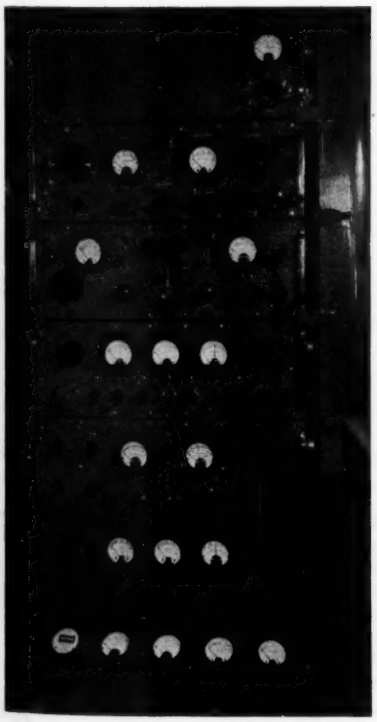
IT'S NEW CHECK IT

crankcase oil supply by a full-pressure, gear-type pump—filtering system is combination full-flow bypass with a replaceable element. Cylinder is a replaceable wet-sleeve. Piston is cam-ground aluminum alloy with full-floating pin. Valves are in head. Entire cylinder head can be removed without disturbing intake pipe, mixing valve, or fuel piping. *Le Roi Co.*

IT'S NEW CHECK IT

(7) TIRE INFLATOR-FIRE EXTINGUISHERS are now available in a heavy-duty size for emergency use in trucks and maintenance garages. Model contains 2½ lb. of CO_2. With this increased capacity, new unit will inflate not only the largest commercial tires (9:00 by 10 to 90 lb.) but also a dozen average-size passenger tires (to approximately 30 lb. each). In addition, it is an effective extinguisher for larger inflammable liquid, grease, oil, electrical, and wood surface fires. Can be used to boost pressure in airbrake tanks on trucks. Compact, and weighing only 8½ lb., unit is easily mounted by means of a metal bracket provided. Cylinder, measuring 17-in. long and 3½-in. in diameter, conforms with I.C.C. specifications, and is factory-tested to many times actual pressure. *Power-Pak Products, Inc.*

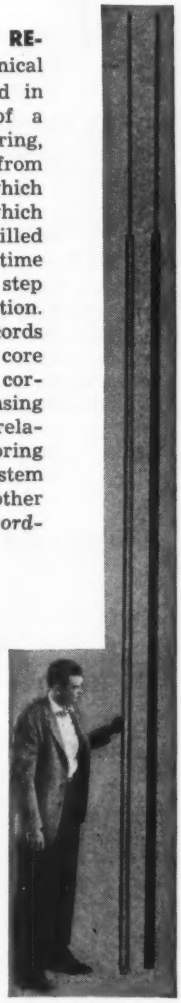
IT'S NEW CHECK IT



(8) NEW WELL-LOGGING UNIT is equipped to record simultaneously four S.P. curves on one trip out of the hole. This record is available to the company representatives on location. New units contain permanent panels for all services. From top to bottom (1) open-hole section logging; (2) gamma ray logging; (3) Photoclinometer and Dipmeter surveys; (4) gun perforating, side wall coring, and casing collar locator; (5) electric logging; (6) induction logging. *Schlumberger Well Surveying Corp.*

(9) NEW CORE RECORDER, a mechanical instrument, is placed in the inner barrel of a core barrel. After coring, a chart is removed from the core recorder which shows the depth at which core is recovered, drilled up, or lost, and the time required for every step in the coring operation. Core recorder records data for more exact core analyses, side-wall coring if necessary, casing seats, geological correlations, improved coring technique, drill-stem testing, and many other operations. *Core Recorder, Inc.*

IT'S NEW CHECK IT



(10) NEW BOTTOM-HOLE PUMP can be actuated by either oil, gas, or water and is designed to meet any operating field conditions. Pumping unit is basically that of a sucker-rod pump, except the stroke is controlled and the hydraulic power fluid eliminates sucker rods. The controlled action and the positive washing of the pump barrel of sand conditions and foreign matter in front of the piston ring on the pump stroke insure long life of the unit. *Dempsey Pump Co.*

IT'S NEW CHECK IT

TRADE LITERATURE

(11) FIELD HOUSING. Folder tells how to simply, quickly erect a group of employ houses in refineries, natural-gasoline plants, leases, etc. Houses are attractive, livable, and economical. *Crawford Corp.*

IT'S NEW CHECK IT

(12) TANKS. New 52-page, 3-color brochure describes and illustrates the facilities and fabrications of manufacturer. All types of L.P.G. tanks, including truck mounted, are covered. Also includes stock tanks and refinery fabrications. *Dallas Tank Co., Inc.*

IT'S NEW CHECK IT

(13) PROCESSING EQUIPMENT. New two-color bulletin describes and illustrates a complete line of processing equipment, including bubble towers, chemical-plant equipment, coolers, heat exchangers, mist extractors, natural-gasoline plants, pressure vessels, and other refinery equipment. *Flint Steel Corp.*

IT'S NEW CHECK IT

(14) JET PERFORATING. How to perforate casing for deeper penetration and increased oil flow is described in new two-color folder. Illustrated. *Welex Jet Services.*

IT'S NEW CHECK IT

(15) IRON-BODY VALVES. New catalog describes many new valves recently developed by manufacturer. Specifications, construction features and cross-section descriptive drawings are given for each type valve; 16 pages. *Stockham Pipe Fittings Co.*

IT'S NEW CHECK IT

(16) WIRE ROPE. A 28-page handbook covers the use and care of wire rope. Illustrations accompany descriptive material on seizing, attaching, and splicing rope. *Wire Rope Corp. of America.*

IT'S NEW CHECK IT

(17) ACRYLOID 150 AND 710. Two booklets describe additives which eliminate the necessity of drastic dewaxing, thereby increasing present capacities of lube plants. Acryloid 150 is a new material designed to lower effectively the pour point of wax-bearing mineral oils. Acryloid 710 is a viscosity-index improver for lubricating oil. *Rohm & Haas Co.*

IT'S NEW CHECK IT

(18) STATITE DRUM CLOSURE. A two-color bulletin describes and illustrates new leakproof and tamperproof drum closure. Enlarged sectional drawing shows the relation of parts of the closure. Seal must be destroyed when drum is opened. *McDowell Manufacturing Co.*

IT'S NEW CHECK IT

(19) SEALS. Manufacturer's house organ, "The Stuffing Box," presents new high-pressure, nonlubricated seal for light hydrocarbons. Oil-industry personnel who wish to receive this monthly literature will be put on mailing list on request. *Durametallic Corp.*

IT'S NEW CHECK IT

(20) FLEXIBLE COUPLING. New 20-page catalog describes and illustrates flexible coupling which permits use of larger shafting and equipment. Specifications, ratings, and cross-sectional blueprint-type diagrams included. *John Waldron Corp.*

IT'S NEW CHECK IT

(21) STAINLESS STEEL CASTINGS. The story on manufacturer's stainless-steel foundry and its work with corrosion and heat-resisting alloys is given in 44-page side-stitched brochure. Contains chart of analysis, characteristics, and applications of standard alloys. *Cooper Alloy Foundry Co.*

IT'S NEW CHECK IT

(22) ELECTRICAL PRECIPITATION. New 24-page bulletin describes how electrical precipitator works in refineries and plants. Material emphasizes precipitator's use for separation and recovery of residual catalyst in fluid catalyst cracking process. Illustrated. *Research Corp.*

IT'S NEW CHECK IT

(23) HEAT-TRANSFER EQUIPMENT. New booklet in four colors describes heat exchangers in terms of management, purchasing, and engineering. Telescopic-jacket water coolers, atmospheric section heads, shell and tube exchangers, floating-head exchangers, and kettle-type reboilers are illustrated in cross-sectional drawings. Includes engineering data on shell-side film coefficients. *Western Supply Co.*

IT'S NEW CHECK IT

(24) GEOLOGICAL MAPS. Material contains information on a set of maps showing formations encountered in wells in Oklahoma. Information emphasizes that maps are well drafted, and extraneous details, such as, railroads, streams, roads, farm names, quarter section lines, etc., have been omitted. *Keplinger & Wanenmacher.*

IT'S NEW CHECK IT

(25) INDUSTRIAL GLOVES. New two-color folder describes heat-resistant gloves which are interchangeable from one hand to another. Gloves are available in knit-wrist, band-top, or gauntlet styles. *C. Walker Jones Co.*

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

REFINING

Socony Will Complete Casper Project This Year

Completion of the general expansion, improvement and rehabilitation program now under way at the Socony-Vacuum Oil Co., Inc., refinery at Casper, Wyo., is scheduled late this year.

Included in the construction program, which will double the refinery's present 3,000-bbl. per day capacity, is a Thermofor catalytic cracking unit, a new light oil transfer pumphouse to handle an increased flow of refined products, a unit to remove hydrogen sulfide from 4,000,000 cu. ft. of refinery gas daily, a steam boiler with a capacity of 30,000 lb. per hour, and special facilities for lime treatment of river or well water to supply the cooling towers and a water treater for the boilers.

General contractor for the project is Catalytic Construction Co. of Philadelphia, Pa., under the supervision of Emory M. Skinner, chief refinery engineer of Socony-Vacuum's White Eagle division.

Gulf Refinery Using Middle East Crude

HOUSTON. — Supplementary supplies of crude oil from Venezuela and the Middle East are being moved by The Texas Co. to its Port Arthur, Tex., refinery.

As far as is known, the shipments mark the first time Middle East crude oil has been received on the Gulf Coast. Petrol Terminal Corp., which late last year began operating a converted high-octane plant in Texas City, has been receiving small amounts of Venezuelan royalty oil.

While no official comment was forthcoming, it was learned The Texas Co. has already sent two cargoes to the Port Arthur refinery. Arabian crude will be received at a rate of about 4,000 bbl. daily, while the Venezuelan shipments are to be stepped up to a total of 14,600 bbl. daily during the months ahead.

Use of South American and Middle East oil on the Texas Gulf Coast is a reflection of the extremely tight crude-oil market. There is known to be considerable bidding for domestic crude by both direct and indirect means.

The Texas Co. at present is at work constructing a new 40,000-bbl. daily capacity refinery at Westville, N. J., near Philadelphia. It is expected that the use of Venezuelan and Middle East oil at Port Arthur will be temporary pending completion of this project. The Port Arthur refinery is now running at its full capacity of about 135,000 bbl. daily.

General Plans Change From Fuel Oil to Gas

A change from fuel oil to gas is planned by General Petroleum Corp. at its refinery near Torrance, Calif., 16 miles southwest of Los Angeles. A 12-in. line will be constructed by General from Inglewood field, where it is now being supplied with wet gas by Basin Oil Co., to the company's plant.

The gas at the refinery will be worked over for liquid byproducts before it is turned into the fuel lines.

Ohio Standard to Build New Lima Refining Unit

Construction of a $5,000,000 combination crude distillation and coking unit to add 15,000 bbl. daily to the crude-processing capacity of the Standard Oil Co. (Ohio) Lima refinery was recently authorized by directors of the company.

The new unit, which will produce feed stock for high-quality gasoline as well as furnace oils and petroleum coke for industrial purposes, will supplement the $11,000,000 fluid catalytic cracking plant now under construction.

Contractors for the job have not yet been selected nor have construction schedules been determined.

The Lima refinery had a daily crude-capacity rating of 18,000 bbl. as of January 1.

Sun Begins Operations At River Rouge Terminal

Large-scale operations at the Sun Oil Co.'s new terminal at River Rouge, Mich., began last week with the unloading of a lake tanker of 840,000 gal. of gasoline from the company's Toledo refinery.

Installations at the terminal include 44 storage tanks with a capacity of more than 8,000,000 gal., facilities for compounding and blending basic grades of lubricating oils into specialized products, a warehouse, an

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office building, and a testing laboratory to insure uniform quality of products.

The warehouse platform of the new terminal, which forms the center of Sun's transportation system in the Detroit area, can accommodate 25 trucks, 6 box cars, and 8 tank cars simultaneously.

Recently plans were announced by Sun for the expenditure of $16,000,000 within the next 2 years to practically double the crude charging capacity of the Toledo refinery.

Blaw-Knox Awarded Pilot-Plant Contract

Blaw-Knox Co. has been awarded a contract by the Bureau of Mines for engineering, procurement, and erection services in completing the bureau's coal-gasification pilot plant at Bruceton, Pa.

The bureau's synthetic-fuels research and development laboratories at the Bruceton experimental station were dedicated in a ceremony May 21.

The pilot plant is part of the bureau's extensive program for the development of information and processes on the production of synthetic liquid fuels from coal. It plans eventually to use the pilot plant to process up to 7,500 cu. ft. of synthesis gas per hour.

The pilot plant will produce a variety of oxygenated compounds in addition to the liquid fuels.

British American Begins Montreal East Refinery

Construction has begun on the new $15,000,000 refinery of British American Oil Co., Ltd., at Montreal East. Completion of the plant is scheduled within 2 years, and will bring the total crude processing capacity of Montreal East to more than 32,000 bbl. daily, it was estimated by W. K. Whiteford, president of British American.

Installation of a fluid catalytic cracking unit in the company's present refinery there, which has a rated crude capacity of 15,000 bbl. daily and a cracking capacity of 7,500 bbl. daily, is expected to be completed some time late next year.

Indiana Standard Group Begins Technical Meeting

More than 200 technical men from Standard Oil Co. (Ind.) and five subsidiary companies met May 24 in French Lick Springs, Ind., to begin a week-long meeting called to discuss research projects.

The meeting is the sixth annual joint technical meeting of the companies, and 84 scientific papers were scheduled for presentation.

Subjects scheduled for discussion included new catalysts; new methods of removing sulfur; application of improved electronic instruments; methods of separating crude oil into specialized fractions for particular jobs; and methods of selecting catalysts and feed stocks that permit catalytic cracking equipment to run well above rated capacity.

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... IS ITS BATTERY OF
HEATERS
FOR EVERY PROCESS THERE IS A
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PIPE LINES

Kansas-Nebraska Natural Expansion Plans Approved

Authority to construct and operate additional natural-gas pipe-line facilities in Kansas and Nebraska has been granted Kansas-Nebraska Natural Gas Co., Inc., by the presiding examiner, subject to review by the Federal Power Commission. Facilities have been estimated to cost $3,121,133.

The proposed construction would increase the company's delivery capacity from 105,000,000 cu. ft. per day to 123,000,000 cu. ft. daily. Facilities include partial looping and replacement of the company's Scott City-Cambridge and Scott City-Holdrege lines; continuation of the existing Otis-to-Stockton line on to Phillipsburg; construction of 35 miles of new line north of Elm Creek in Nebraska; lateral lines and town border stations to serve the additional towns, and installation of one 1,600 hp. compressor unit at its Deerfield compressor station in Hugoton field.

P.I.W.C. Pipe Line Map Is Reissued

Shell Pipe Line Corp. and L. L. Ridgeway Co. are keeping up to date two maps of petroleum pipe lines in the United States, originally underwritten by Petroleum Industry War Council. A map of Central United States is being reissued. Special attention has been given to the location of important outlets in West Texas and the Rocky Mountains which are under construction or recently completed. Copies of the map may be obtained from L. L. Ridgeway Co., 615 Caroline Street, Houston.

Midland Station Contract Let by Texas Pipe Line

Texas Pipe Line Co. has let contract to Brown Lane Co. for construction of an electric centrifugal pump station on the Jal-Cushing 20-in., 22-in., 24-in. crude-oil line now being laid. The station is to be built 2 miles east of Midland. Work is scheduled to commence at the end of May.

El Paso Natural to Start Dumas Extension

El Paso Natural Gas Co. will begin construction early in June for a 248-mile, 24-in. extension from the Permian Basin area of New Mexico to Dumas, in the Texas Panhandle. The new line will connect with the company's system near Oil Center, 22 miles southwest of Hobbs, N. M.

This extension will provide the first facilities for transmitting Panhandle gas to Arizona and California. Last year El Paso Natural's system serv-

Welders preparing to work on 20-in. pipe at an overhead crossing for the Colorado Interstate Gas Co. system for transmitting gas from the Lakin, Kans., area

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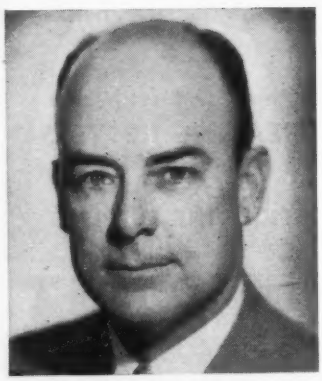

With 20 years experience in pipelining, N. K. McFarland, secretary and treasurer, knows what it takes to insure a satisfactory pipeline job —when Mac isn't buried in figures in the office he likes to be out in the field helping to make more Oklahoma Contracting history.

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The Oldest Pipe Line Contracting Company in the Business . . . Specializing in Oil, Gas and Gasoline Pipe Lines for Over 30 Years

OKLAHOMA
CONTRACTING CO., Inc.
MERCANTILE BANK BLDG.
DALLAS 1, TEXAS

ing Phoenix and Tucson, Ariz., was augmented by the construction of a 740-mile, 26-in. line from Eunice, N. M., to Blythe, Calif., where it connects with the 214-mile, 30-in. line of Southern California Gas Co. and Southern Counties Gas Co. to Los Angeles.

Triangle Operates Products System From Carthage, Tex.

Triangle Pipe Line Co. has just put in operation its 141-mile products pipe-line system which extends from Carthage, Tex., through the Shreveport, La., area to El Dorado, Ark., where it connects with the Project Five system to Helena, Ark., operated by Gulf Refining Co. Cost of the Triangle system is reported to be $1,000,000. Capacity is rated at 20,000 bbl. daily.

With the exception of 43 miles of 8-in. recently laid for the system at the west end under contract with Sheppard Geiger Construction Co., the Triangle system consists of old lines acquired from several companies. Construction on the new west section began in December 1947.

Scale removal from the interior of the line has presented numerous problems during early stages of operation, according to reports.

The Triangle project has been planned for handling gasoline and kerosine from the Carthage, Shreveport, and Cotton Valley areas.

Phillips Laying Lines in Odessa, Tex., Area

Phillips Petroleum Co. is laying approximately 23 miles of lines of 5-in., 6-in., 8-in., 10-in., and 24-in. diameter. The work has been contracted by Vaughn & Taylor and is being done under supervision of D. D. Vaughn for completion June 10. This firm is also taking up more than 5 miles of 3-in. line near Borger.

For Texoma Natural Gas Co., this contractor is taking up and reconditioning 13 miles of pipe between 4-in. and 24-in. diameter in the Kingsmill, Tex., area where it is laying 2 miles of 4-in. and 6-in. supervised by R. L. Taylor.

Ohio Fuel Gas Revamps Sugar Grove Lines

Ohio Fuel Gas Co. will start June 10 to lay approximately 48 miles of 20-in. near Sugar Grove, Ohio. In this same locality the company will take up 97 miles of pipe of 4-in., 6-in., 8-in., 10-in., 12-in. and 16-in. diameters. Both projects have been contracted by Midwestern Constructors, Inc., which will have the work supervised by Clyde Peters, superintendent, who will have headquarters at Lancaster, Ohio. Other jobs contracted by

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SPEED: Complete cut and bevel can be made on 12 inch pipe in about 2 minutes.

ECONOMY: Save approximately one-half labor and gas costs.

PORTABILITY: Can easily be carried from one pipe section to another.

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NO PATCHING OR SPLICING
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Midwestern from Ohio Fuel Gas include the laying of 4 miles of 10-in. near Sidney, Ohio, and 8 miles of 10-in. near Mount Vernon, Ohio, as well as the removal of several miles of 8-in., 10-in. and 16-in. near Dayton, Norwalk and Mount Vernon.

On July 1, Midwestern has contracted to begin work on two projects. For Natural Gas Pipeline Co. of America it will lay 13.6 miles of 26-in. near Oscaloosa, Iowa, and 13.8 miles of 26-in. near Geneseo, Ill. Both of these jobs will be supervised by M. T. Wilhite, superintendent. Near Wood River, Ill., the firm will relocate 20,000 ft. of 8-in., 10-in., and 16-in. in the vicinity of the Chain-of-Rocks canal for Shell Pipe Line Corp.

Brown & Root, Inc., has subcontracted to Midwestern the laying of 27 miles of 6-in., 8-in. and 12-in. in the urban area of Philadelphia for Texas Eastern Transmission Corp. Because of the difficulties of operating in a metropolitan area, the work is expected to continue for 4 months.

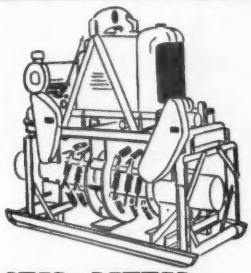
Socony-Vacuum to Start Two Products Lines

Socony-Vacuum Oil Co., Inc., awarded contract to Midwestern Constructors, Inc., for the laying of a 165-mile, 8-in. products pipe line from Malvern, Pa., to Binghamton, N. Y. The project will be coated with Somastic for its entire length. Work will start early next week under the direction of R. C. Stanley, superintendent, who is establishing a field office at Pottstown, Pa. Later this office will be moved to Allentown, Pa.

Associated Contractors & Engineers are moving in equipment for laying of 127 miles of 4-in. and 6-in. contracted from Socony-Vacuum Oil Co., Inc., for a products pipe line from Portland via Augusta to Bangor, Me.

Although soil conditions along the route of the Portland-Bangor line may not be considered to be exceptionally corrosive, the project traverses territory in which the terrain changes abruptly from rocky conditions to peat bogs in numerous localities. Rather than spot-treat this line to protect against corrosion, it was decided that Somastic would be applied for the whole length of the project.

One of the coating plants which has been operating for the Cygnet-Cleveland, Ohio, line of Buckeye Pipe Line Co. and Sohio Pipe Line Co. will be transferred to the Socony-Vacuum Portland-Bangor line. Sites for unloading, stockpiling, and coating have been selected at New Gloucester, South Gardiner and Unity, Me. Coating operations in Maine commenced the middle of this month. Although the contractor will operate only one spread for the project, coating operations will be carried on by two shifts in order that deliveries of coated pipe to line may be at an adequate rate



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Among the

Drilling Contractors

Tulsa A.A.O.D.C. Chapter Formed During Oil Show

Tulsa members of the American Association of Oilwell Drilling Contractors held a dinner meeting during the week of the International Petroleum Exposition and formed a local chapter.

Frank Stickle of Stickle Drilling Co. was elected chairman of the group and Jack Milhoan of Milhoan Drilling Co. is vice chairman. E. C. Brown, president of the A.A.O.D.C., and Brad Mills, executive vice president, addressed the dinner meeting.

Stickle has announced that the new chapter plans to hold weekly meetings at a place to be designated at a later date.

Mercury Drilling Co., Tulsa, has started a 5,000-ft. test, its 2 Burroughs, C W½ NE NW 11-17n-1e, Payne County, Oklahoma.

Lewis Drilling Co. has staked location for its 1 Alington, wildcat in SW SW SW 36-21-10, southern edge of Rice County, 6 miles north of Zenith-Peace Creek pool, Reno County, Kansas.

Helmerich & Payne, Tulsa, have opened a pool in Reno County, Kansas, with their 1 Stucky, SW SW SW 14-26-6, 10 miles west of Hilger pool and 3 miles east of town of Pretty Prairie. Test was completed with a flowing potential of 51 bbl. daily from the Mississippi.

B and B Drilling Co., Inc., Russel, Kans., is drilling an outpost to Kowalsky pool in southeastern Barton County, Kansas. Test is 1 Dannebohm, NE NE SW 36-20-12.

Falcon Seaboard Drilling Co., Tulsa, is contractor for Toklan Production Co. 1 Robert Selman, wildcat in C NW NE 10-26n-20w, Harper County, Oklahoma.

Mallard Drilling Co., Wichita, and Westgate-Greenland Oil Co. are drilling a Kansas wildcat, their 1 Dobrinski, SE NW NE 16-17-9, ¼ mile north of town of Lorraine and 2 miles west of Lorraine pool in southern Ellsworth County, Kansas.

Crescent Drilling Co., Monroe, La., is planning a 9,500-ft. test in Lincoln Parish, North Louisiana, its 1 Mathews, NE 29-19n-2w, in old Ruston field. Objective is the Cotton Valley.

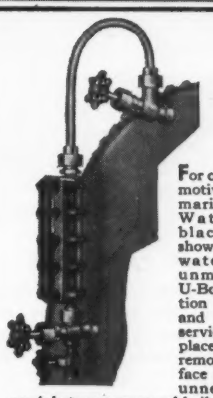
Brunson Drilling Co., Wichita, has received two recent wildcat contracts in Kansas. First is Max Cohen 1 Bright, NW NW SW 1-24-16, Pawnee County, 2½ miles south of Benson pool. Second is William L. Graham et al 1 Schmidt, NE NE SE 22-12-17, 2 miles northeast of Schmeidler pool, Ellis County.

This Olson Drilling Co. (Tulsa) crew is drilling a well for Gulf Oil Corp. in the Eunice, N. M., area. Pictured are: A. D. Lewis; B. D. Stowers; Perry Pickens; W. N. Eubanks, driller; and E. R. Williams, tool pusher

PENBERTHY

"REFLEX"

WATER GAGE SET



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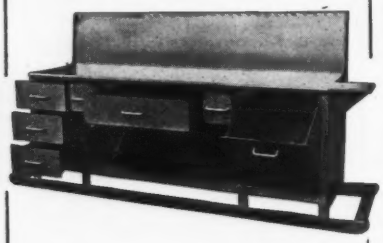

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Growth.—Woods Drilling Co. was organized on paper in Sydney, Australia, during World War II when J. L. Woods and C. F. Gilchrist met on an 18-day occupational leave. Woods served as a lieutenant commander with the PT boats and Gilchrist as a colonel, U. S. Air Corps. After discharge from service in 1947, the two men bought a rotary rig and commenced wildcatting in Oklahoma. They drilled six straight wildcats before discovering Iconium Northwest pool, Logan County, Oklahoma, on the seventh try.

J. L. WOODS

C. F. GILCHRIST

FRANK WALLACE

Personnel.—Frank Wallace, for 20 years drilling superintendent for Wilcox Oil Co., recently joined the company as vice president in charge of drilling. Wallace served in the U. S. Air Corps during World War I. R. R. Birdsong, Coyle, Okla., is superintendent of production. Capt. Phillip Seymour, U.S.N. (ret.), holder of the Navy Cross, is in charge of the company's land department. Anna Hassinger is secretary and treasurer, and Harry Hull is accountant.

Sidelights.—Company now has production of 1,000 bbl. daily with many proven locations yet to be drilled in Northwest Iconium pool. . . . It has added four new rotary rigs and can handle any drilling from the grass roots to 13,000 ft. . . . Operates primarily as wildcatters and has four wildcats drilling currently with a schedule of three wildcats monthly for the remander of the year. . . . Offices are maintained in New Orleans and Tulsa.

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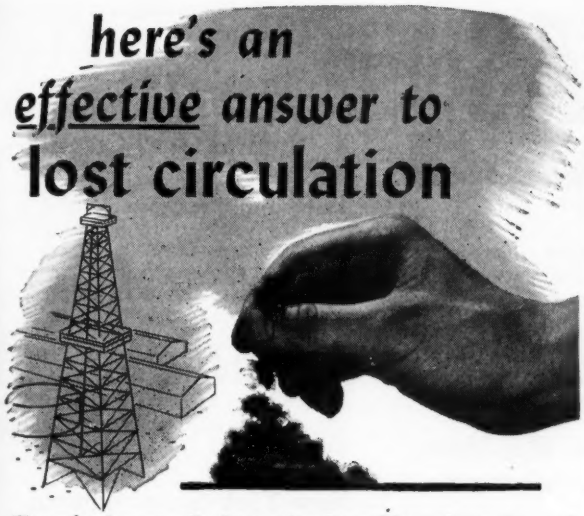

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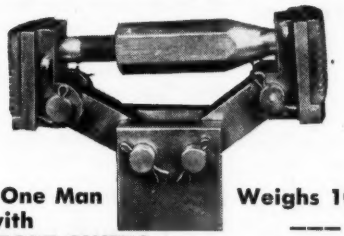

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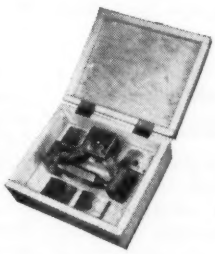

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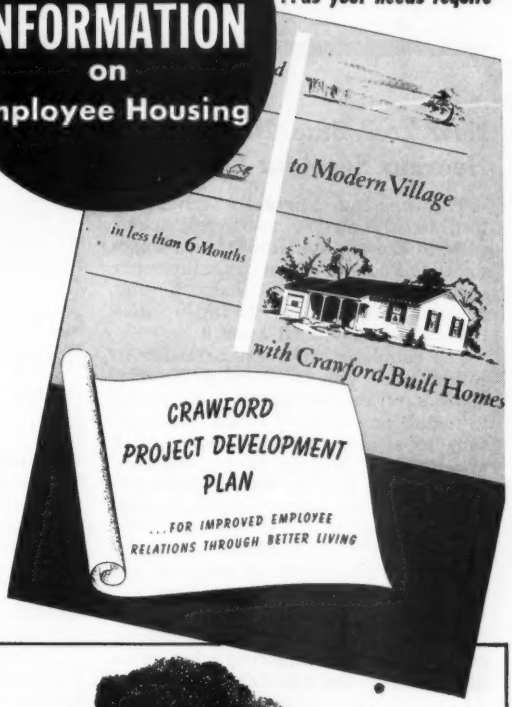

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NATURAL GAS

New York State Natural Hearing Reset for June 8

The hearing originally scheduled for May 17 on the two applications of New York State Natural Gas Corp. to the Federal Power Commission seeking to acquire, construct, and operate natural-gas facilities, has been postponed until June 8.

The company seeks authorization to sell natural gas to Peoples Natural Gas Co. on an interruptible basis and to install and acquire facilities necessary to effect such sales, to acquire and operate a pipe line owned by Empire Gas & Fuel Co. of Pennsylvania, and to construct measuring stations in New York together with the necessary connections to supply additional quantities of natural gas to Empire Gas & Fuel Co., Ltd.

Postponement was requested by New York State Natural because of company witnesses having other commitments on the scheduled date.

Tulsa University Plans Two L.P.G. Short Courses

Two gas-appliances short courses have been scheduled by the University of Tulsa, College of Petroleum Sciences and Engineering. The first series May 31 to June 2 is sponsored by the Southern Gas Association with speakers and teachers representing companies from widespread areas. The 1948 L.P.G.-Appliances Short Course will follow June 2-5.

In addition to classes, there will be an inspection tour through Oklahoma Natural Gas Co. Fields of study will include products, supply, operation and installation, and innovations in the industry.

United Natural Seeks Additional Facilities

United Natural Gas Co., Oil City, Pa., has requested authority from the Federal Power Commission to construct facilities, estimated to cost $3,057,500, to enlarge its natural gas transportation system.

Proposed facilities include replacement of about 20½ miles of 12-in. pipe line in Elk County, Pennsylvania, with 22¾-in. pipe; construction of about 29 miles of 12¾-in. pipe line between a storage field and a compressor station in Elk County; about 4½ miles of 10 or 12-in. pipe line from a proposed storage field to a compressor station in Jefferson County, Pennsylvania; several short connecting lines in Jefferson and Clarion counties and installment of an aggregate of 1,650 hp. in existing compressor stations in Jefferson and Elk counties.

Cabot Carbon Will Make Headquarters at Pampa

Cabot Carbon Co., manufacturing subsidiary of Godfrey L. Cabot, Inc., for the production of carbon black, will make its southwestern headquarters at Pampa, Tex., and is awaiting the construction of a new six-story building there.

Construction of the building, of which Cabot Carbon Co. has the top two floors and the auditorium, is scheduled to be built as soon as plans now under way are completed.

The field offices of the company's Texas and Oklahoma Panhandle areas will be housed in the new building.

Kentucky West Virginia Hearing Is Postponed

The Federal Power Commission has postponed until June 7 a hearing on rate schedules proposed by Kentucky West Virginia Gas Co. The rate schedules, to cover sales of gas to Pittsburgh and West Virginia Gas Co. and Louisville Gas & Electric Co., were suspended by the Commission March 18.

The suspended schedules would permit a reduction to 1,000 b.t.u. a cubic foot in the heat content of the gas supplied to Pittsburgh and West Virginia and to the Louisville company, and would provide automatic adjustment clauses reflecting increases in certain taxes and production costs, and establish a new minimum bill.

Kentucky West Virginia made the request for the postponment.

Lone Star Requests Additional Facilities

Lone Star Gas Co., Dallas, Tex., has requested authority from the Federal Power Commission to construct and operate natural-gas facilities in Oklahoma and Texas.

The proposed project, estimated at $1,059,500, includes installation of an aggregate of 2,400 hp. in Fox Central compressor station, Carter County, Oklahoma, and an aggregate of 3,620 hp. in compressor stations in Cook, Knox and Grayson counties, Texas.

Superior Is Found Not A "Natural Gas" Company

Superior Oil Co. of Houston will not be construed to be a "natural gas company" subject to Federal Power Commission jurisdiction by reason of the company's proposed sales of natural gas to Southern Natural Gas Co., it was recently announced by FPC.

Superior owns and operates oil and gas leaseholds and eight gas-producing wells in Gwinville field, Jefferson Davis and Simpson counties, Mississippi.

New York State Natural Seeks Construction Permit

New York State Natural Gas Corp., Pittsburgh, Pa., has requested authority to construct and operate facilities as a substitute for certain natural-gas pipe-line loops previously authorized for construction in 1947 and 1948.

The company proposes construction in 1948 of a new 3,600-hp. compressor station in Westmoreland County, Pennsylvania, as a substitute for part of the uncompleted project. This would enable the company's pipe-line system to receive a total of 108,700,000 cu. ft. of natural gas daily from Hope Natural Gas Co. and Texas Eastern Transmission Corp. The present maximum capacity of the line is 89,000,000 cu. ft. daily. Cost of the proposed plan is estimated at $890,000.

New York State Natural also has requested that it be authorized to construct a total of about 62 miles of 16-in. pipe-line looping as a substitute for other looping operations authorized by FPC. Proposed construction would begin in 1949 and the pipe line would have a delivery capacity at Pew Station of approximately 130,000,000 cu. ft. of gas daily.

FPC Allows Mississippi River Fuel Rate Schedule

Supplemental rate schedules of Mississippi River Fuel Corp., St. Louis, Mo., have been authorized by the Federal Power Commission to take effect May 1, 1949. The rate supplements provide for emergency service rules and regulations governing curtailments of natural gas.

The emergency service rules provide for (1) curtailment of all interruptible loads, (2) curtailment of approximately 25 per cent of firm industrial loads, and (3) for the delivery of specific quantities of gas to distributing customers.

The new emergency rules allow an increase of 6 per cent over last year to Mississippi's distributor customers.

Exploration and Drilling

Wyoming Wildcat Becomes World's Deepest Producer

THE world's deepest producing oil well is Pure Oil Co. 1 Unit, NW SE 11-33n-84w, discovery well of West Poison Spider pool in Natrona County, Wyoming. Total depth is 14,307 ft. (corrected), and production is coming from about 120 ft. of Frontier sand (Upper Cretaceous), according to announcement by the company.

On a 41-hour drill-stem test, the well flowed 34 bbl. per hour of green 44°-gravity oil through a 47/64-in. choke on 2⅞-in. drill pipe. The last 24-hour gage averaged 34.8 bbl. per hour. A string of 7-in., 35-lb. pipe is cemented with 400 sacks at 13,791 ft., and production packer was set on the 2⅞-in. drill pipe at approximately 13,600 ft., inside the 7-in.

Although the well is geologically isolated and opens up a very large area for much more intensive exploration, geographically it lies only about 30 miles due west of Casper. It is only 12 miles from the Sinclair Refining Co. 6-in. oil line, and about 15 miles from Stanolind Pipe Line Co. 12-in. oil line, both running into Casper. It is 5 miles or less from two gas pipe lines, Northern Utilities Co., and North Central Gas Co.

Geologically the new discovery is in the east or southeast corner of the Wind River basin, so close to the dividing line between that basin and the Powder River basin, that although the Frontier is found below 14,000 ft. under the derrick floor, the same formation outcrops at the surface only about 4 miles east.

The nearest Wind River basin field is Muskrat, about 50 miles west, in Townships 33 and 34 North, Range 92 West. Muskrat produces gas from the Frontier sand at about 4,140 ft., or approximately 10,000 ft. shallower than the new discovery. Muskrat is a surface structure on what is probably a substantial uplift, and some oil has been found in the Embar (Tensleep equivalent?) at 7,200-300 ft., or about 3,100 ft. interval below the Frontier.

West Poison Spider on the other hand is in an area where the surface is covered by Tertiary, and was located by seismograph. If the Frontier-Embar interval were about the same as at Muskrat, the Embar might be found at around 17,500 ft. However, if the offsets to the discovery perform well in the Frontier, it is apt to be a long time before Pure decides to test the Embar, particularly in view of the pipe situation. The chances are, in view of the regional geology, that the new field will be on a structure with a general northwest-southeast axis.

This general vicinity is described in an old U.S.G.S. Bulletin, 641-I (1916), pages 233-279, "Anticlines in Central Wyoming," by C. J. Hares. It is also covered by a fairly recent "Oil and Gas Investigations, Preliminary Map No. 51" of the survey, which is a reissue of the geology, recorded as "mapped by plane-table surveys in 1913-14. Geology by C. J. Hares, assisted by M. W. Ball, Stuart St. Clair, J. B. Reeside, Jr., K. C. Heald, and A. C. Collins." These are familiar names to many geologists, and some of them are well known today throughout the entire petroleum industry. They and their friends will undoubtedly get a thrill from the fact that the world's deepest producing oil well is located in an area where they did field work 35 years ago.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

ROCKY MOUNTAIN.—Large scale leasing and geophysical work in Wyoming is now being conducted as a result of Pure Oil Co.'s discovery at West Poison Spider, world's deepest producing well. The operator is reported preparing to complete the discovery, which flowed 34 bbl. of oil from the Frontier formation at 14,307 ft., total depth. During the week another discovery in Wyoming found a new producing horizon for the region: Sinclair Wyoming's Lost Soldier deep test, which flowed 10 bbl. of oil per hour from the Deadwood (Cambrian) formation.

PERMIAN.—Southern Minerals Corp.'s Coke County wildcat, 1 Reed, 10 miles southeast of Robert Lee, was taking initial potential, after flowing 192 bbl. of oil plus 308 bbl. of salt water from the Ellenburger. Another Coke County Ellenburger well was in prospect, 3 miles northwest of the 1 Reed, at Shamrock's 1 Wendland. Skelly Oil Co. was moving in rotary rig for offset test at new Crossroads field, Lea County, New Mexico.

NORTH TEXAS.—Kingwood Oil Co. 1 Garrett has extended conglomerate production 1¼ miles northwest of the Chico field of Wise County. The well flowed 70 bbl. of oil in 3 hours through 22/64-in. choke, but operators reported a gas-oil ratio of 3,800 cu. ft. Pressure on tubing was 1,450 psi. Cities Service 1 Berry, southwest outpost to Chico, flowed 56 bbl. of oil in 20 hours through ¾-in. choke, from pay at 5,134-5,260 ft.

CALIFORNIA.—Interest is centered in Jergins Oil Co. and North American Oil Co. 1 Orradre, 12-23s-10e, Monterey County, which flowed 7,500,000 cu. ft. of gas from what is thought may be the gas cap of a large oil field. Two other ventures in the area have been staked by the same operators to test the theory of such an oil field, which would be the second for the county.

SOUTHWEST TEXAS.—Texas Co. brought in a deep gas-condensate discovery at their 1 State Tract 9, in Corpus Christi Bay, Nueces County, which produced 121 bbl. of condensate and 3,200,000 cu. ft. of gas from 10,675-88 ft.

SOUTH LOUISIANA.—Humble Oil & Refining Co. 1 Grand Isle, State Lease 801, in the Gulf of Mexico, discovered top of a salt dome at 7,607 ft., with oil shows in sands some 500 ft. above the dome.

Give that equipment lasting PROTECTION!

"Coro-Gard" ANTI-CORROSION COATING

What's the difference between "Coro-Gard" and other anti-corrosion coatings? It lies in the unique synthetic rubber-resin formula, tailored to provide maximum resistance to petroleum. It lies in the anchored-in-the-coating plasticizer which also gives "Coro-Gard" permanent resilience.

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TEXAS GULF COAST

New Gas and Condensate Pool in Newton County

HOUSTON.—A new gas and condensate pool approximately 1¼ miles south of Gist field in Newton County has been brought in by American Republics Corp. 1 Newton County Lumber Co., in the P. L. & I. Wheaton Survey, Section 2, Abstract 544. Perforations were made from 7,322-24 ft., and the well flowed an unestimated amount of gas and condensate. Well is shut in waiting on storage tanks. Shut-in pressure on the tubing is 2,750 psi. Sands carrying salt water were encountered at 5,990 ft.

Grubb & Hawkins 1 Mrs. Blanche G. Rogers, wildcat test 1 mile southwest of Bammel gas production in Harris County, is flowing at the rate of 20 bbl. of oil per day through perforations at 6,420-24 ft. Total depth is 7,325 ft. Gravity is 34.1°, and flowing pressure on the tubing is 480 psi.

Cities Service Oil Co. 2 John Schobal, in the northeast extension area of Columbus field in Colorado County, was completed for an official flow of 198.94 bbl. of oil per day through a 14/64-in. choke with 2,090 psi. flowing pressure on the tubing. Gas-oil ratio is 7,655. Gravity of the oil is 44.6°.

Phillips Petroleum Co. C-3 Houston has been completed as an excellent oiler for Chocolate Bayou field, Brazoria County. Located in the Hooper & Wade Survey, Section 6, Abstract 457, this well was drilled to a total depth of 8,801 ft. and plugged back to 8,695 ft. for the completion. On a 24-hour official flow gage, the well made 253.08 bbl. of 41.7°-gravity oil per day through an 11/64-in. choke with 1,500 psi. flowing pressure on the tubing. Gas-oil ratio is 1,340. Production is through perforations at 8,675-90 ft.

Miles Production Co. 1 Harry O. Blanding, wildcat in the Cleveland area of Liberty County, reported a 24-ft. section of sand showing oil and gas from 5,930-54 ft. Pipe has been set in the hole for a production try but due to a leaking joint in the 4,500-ft. level, test has been delayed. Operators are cementing off this leak.

The 36 new locations reported for Districts 2 and 3 included 10 wildcat starts, 2 each in Chambers and Karnes, and 1 each in Goliad, Jefferson, Live Oak, Orange, Victoria and Wharton counties. One gas-condensate discovery was reported for Chambers County while seven wildcats were failures, two in Victoria and one each in Bee, Gonzales, Harris, Jackson and Wharton counties.

TEXAS GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCAT

Chambers County: New gas-condensate discovery—Humble Oil & Gas Co. C-1 W. C. Tyrrell, Jr., Tr., et al, in H&TC Sur., Sec. 65, Abs.. 135, 1 mi. off SW flank of production at Anahuac, TD 8,815 ft., top sand 8,728 ft., perf. 8,728-48 ft., IP: 43 bbl. condensate per day and 1,250,000 cu. ft. gas per day through a 3/16-in. choke, GCR 27,500, TP 1,800 psi., 43.5° gravity.

TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES

Bee County: Dirks Bros. B-1 Magnus Beck, in John Van Bibber Sur., 2 mi. SE of Tuleta and about ¾ mi. S of old Tuleta field, dry, TD 4,221 ft.

Gonzales County: Continental Oil Co. 1 R. E. Harrison, in Sarah Smith Sur., 3 mi. E of Waelder, dry, TD 5,310 ft.

Harris County: Placid Oil Co. 1 Mrs. D. F. Smith et al, in John Merry Sur., ⅛ mi. W of Huffman townsite, dry, TD 8,750 ft.

Jackson County: H. R. Smith et al 1 Four-Way ranch, in Peter Aldrich Sur., 3 mi. E of La Ward townsite, dry, TD 8,905 ft.

Victoria County: Bridwell Oil Co. 1 Teresa Fromme, in Diego Garcia Sur., 7 mi. SE of Victoria, dry, TD 5,972 ft.

Quintana Pet. Corp. 1 Henderson & Pickering, in SA&M RR Sur. 72, 3 mi. NW of Placedo, dry, TD 7,569 ft.

Wharton County: Claud B. Hamil 1 Mentor Northington, EL&RR Sur. 15, N of Egypt gas field, dry, TD 7,713 ft.

EASTERN TEXAS

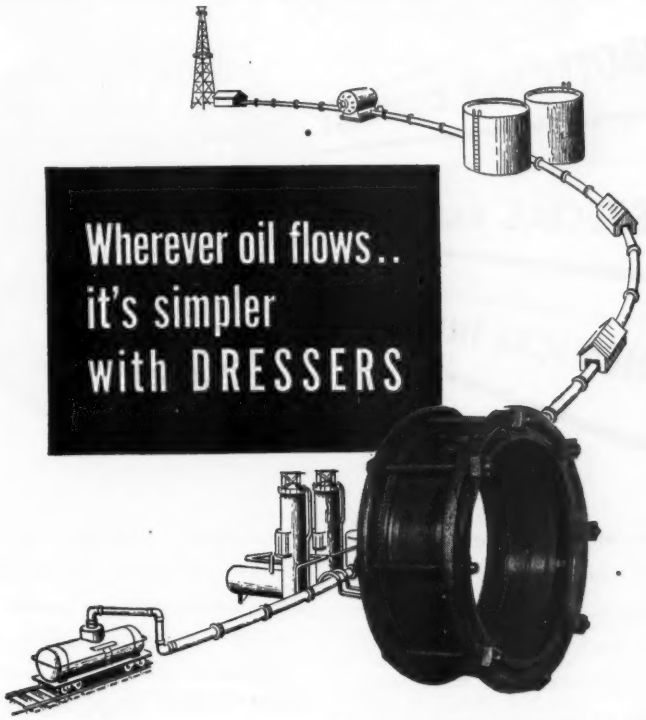
Exploratory Work Steady, Development Work Down

DALLAS.—Union Producing Co. 1 Bolton, Edwards limestone wildcat 7 miles north of Lufkin in Angelina County, had total depth at 6,214 ft. Operators mixed 1,000 bbl. of 11½-lb. mud and pumped into the hole, but got back salt water cut with mud. On last report it was still losing returns and flowing salt water.

In Falls County, 5 miles southwest of Koose, Seaboard Oil Co. 1 J. E. Green was drilling ahead below 4,089 ft. in lime. At total depth of 3,812 ft., with packer at 3,794 ft., a 30-minute drill-stem test produced a fair blow throughout the time the tool was open but had no surface pressure. Recovery was 150 ft. of slightly gas-cut mud and salty water. Flowing bottom-hole pressure was 100 psi.

Warren Oil Corp. 1 Lawrence Unit, 2½ miles west of Longview, in the Alexander Ferguson Survey, was drilling below 3,946 ft. The well kicked mud out of the hole while drilling at 3,512 ft. Base of the Austin chalk was 3,460 ft.

New exploratory work in East Texas areas is holding fairly steady, while development well completions have fallen off



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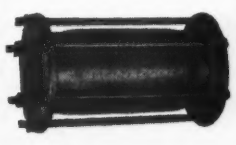

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(Style 40)

...span the gap, make tight connections when pipe ends don't meet.

DRESSER COUPLINGS

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over the past year. According to reports, John G. Mayo has completed arrangements for a 7,000-ft. wildcat 4 miles southeast of Isle, in Sabine County. Location is on land owned by Temple Lumber Co. in the J. S. Cheveral Survey, and is a Gulf Oil Corp. farmout. In San Augustine County, southwest of the Bland Lake discovery well, Bell and associates were said to have taken a spread of leases and will start a well around June 1. Location was to be on a 183-acre tract of S. W. Burnham, in the Quirk Survey.

Completions for the week reflect the lull in development. There were one oil well, one gas well and four failures finished, including three dry wildcats. The oil completion was in the Merigale-Paul area while the gas well was in Rodessa field. New locations during the week totaled 13, including 1 wildcat each for Robertson, Smith and Wood counties. New locations, by fields, were: Como four, and one each in Cayuga, Carthage, Sand Flat, Hawkins, Tri-Cities and Yantis.

EAST TEXAS (DISTRICTS 5 & 6) WILDCAT FAILURES

Anderson County: C. Andrade et al 1 A. F. Fitzgerald, 5 mi. E. Montalba, dry, TD 5,233 ft. in Eableford shale, no shows, Navarro chalk 2,810 ft., Pecan 3,485 ft., Austin 4,642-5,000 ft. by samples.

Grayson County: The Texas Co. 1 C. C. Hutchinson "B," I&GN Sur., A-1,440, 10 mi. NW Gordonville, dry, TD 2,084 ft.

McLennan County: Joe Thompson 1 P. E. Shelby, T. J. Chambers Sur., 2 mi. SW Waco, dry, TD 1,586 ft., Goodland 920 ft., Paluxy 1,033 ft., Glen Rose 1,060 ft., by samples, elev. 450 ft.

Robertson County: Johnston & Johnston 1 Mrs. Vera Hearne, Ann McMillan Sur., A-225, 5 mi. SE Bremond, dry, TD 2,130 ft., no shows.

Three methods are widely used to prevent corrosion — protective coatings, special alloys and chemical inhibitors. Each has special merit under certain conditions; but, when water, quiescent or recirculating, remains in contact with ordinary metals, a chemical inhibitor is generally indicated.

Mutual chromates are used extensively as corrosion inhibitors. In most instances surprisingly small amounts are required to prolong indefinitely the life of the exposed metal. These applications include: recirculating spray systems for air washing and conditioning, cooling systems for internal combustion engines, refinery condensers and heat exchangers, oil well drilling muds, slushing compounds and water-soluble cutting oils, gasoline pipe lines, refrigerating brines and sealed-in absorbents for unit refrigerators.

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SOUTHWEST TEXAS

Deep Gas-Condensate Well in Corpus Bay

CORPUS CHRISTI. — The Texas Co. 1 State Tract 9, new deep gas-condensate discovery in Corpus Christi Bay, Nueces County, showed production of 121.5 bbl. of condensate and 3,200,000 cu. ft. of gas per day through a 5/32-in. choke, with working pressure and shut-in pressure of 7,250 psi. Total depth is 11,563 ft. with 5½-in. casing set to 10,757 ft. Production is through perforations at 10,675-88 ft. This well is located in State Tract 9 in the bay, 3¼ miles southwest of Ingleside, a town on the north shore of Corpus Christi Bay, in San Patricio County.

Humble Oil & Refining Co. MC-1 King Ranch-West Borregas, new discovery approximately 4½ miles northwest of the Borregas field, in northwestern Kleberg County, flowed 24 bbl. of fluid per day, being 17.8 bbl. of oil plus 27 per cent salt water, with gas-oil ratio of 19,391. Gravity of oil is 40.2°. Total depth is 7,047 ft., with production through perforations at 5,960-64 ft.

A new oil discovery for Duval County has been completed at Pantex Corp. 1 Dinecio Perez, approximately 2 miles northeast of Richardson field and 8 miles northeast of Bruni, in southwestern Duval County. On production test the well produced 72.6 bbl. of 23.7°-gravity oil per day on the pump, with no gas or water, through perforations at 2,593-2,604 ft. Total depth is 3,207 ft. with 5½-in. casing at 2,658 ft. This well is located in the T&NO RR Survey 141. Operator now is drilling 2 Perez, 660 ft. northeast of the 1 discovery well.

Humble B-3 Kenedy, wildcat 3 miles northeast of Sarita, in northern Kenedy County, flowed 1,700,000 cu. ft. of gas per day through ⅜-in. choke on drill-stem test open 4½ hours through perforations at 7,777-83 ft. Operators are now testing through perforations at 5,894-5,909 ft. Total depth is 10,342 ft., with 5½-in. casing at 7,894 ft. The B-4 Kenedy, 2,830 ft. east-southeast of the B-3 well, in El Paistle Grant, is rigging up.

There were 41 new locations reported for Districts 1 and 4, with 13 being wildcat starts, 4 in Starr, 2 in Duval, and 1 each in Bexar, Brooks, Burnet, Caldwell, Jim Hogg, and Jim Wells counties. Wildcat completions were 2 successful in Duval, and 11 dry holes, 5 in Duval and 1 each in Bexar, Brooks, Hidalgo, Jim Wells, Nueces, and Williamson counties.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) SUCCESSFUL WILDCATS

Duval County: New oil pool "Pantex"—Pantex Corp. 1 Dineoio Perez, T&NO RR Sur. 141, 8 mi. NE of Bruni, 2 mi. NE of Richardson field, TD 3,207 ft., perf. 2,593-2,604 ft., IP: 73 bbl. oil per day on pump, no gas, gravity 23.7°, no water.

New oil pool, "Lovia"—R. F. Schoolfield & H. J. Gravis 1 J. F. Welder Heirs, in Sur. 213, 7 mi. NE of Freer, 1 mi. S of Seven Sisters field and 2 mi. N of Loma Novia field, top pay 2,667 ft., TD 2,684 ft., open hole 2,662-84 ft., IP: 44 bbl. oil per day on pump, GOR 100, no water.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES

Bexar County: J. M. West 1 Joanna Timberlake, in Juan Manuel Drriegas Gr., 9 mi. S of San Antonio, 1 mi. N of Alta Vista field, dry, TD 4,464 ft.

Brooks County: Signal Oil Co. 1 Andres C. Lopez, in El Tule Gr.; 15 mi. W-SW of Falfurrias, dry, TD 7,016 ft.

Duval County: Argo Oil Corp. 1 Jose C. Lopez et al, in Manuel Ybanez Sur. 130, 13½ mi. N of San Diego, dry, TD 4,956 ft.

Government Wells Oil Co. 1 J. M. Canales ranch, in Blk. 2, J. M. Canales

ranch, Los Tramojos Gr., 8 mi. NW of Premont, dry, TD 4,012 ft.

J. C. Hawkins & W. M. Nicholls 1 Maria Tampez, in C. Tampez Sur. 24, dry, TD 3,952 ft.

Fred W. Shield & M. L. Massingill 1 J. R. de Almarez, AB&M Sur. 135, 4½ mi. SE of Kreis field, 5 mi. E-NE of Terancahuas field, 1½ mi. N of Rosita, dry, TD 4,040 ft.

Trio Oil Co. & B. C. Renick 1 J. F. Welder Heirs, in Sur. 222, 2 mi. NW of Squire field, dry, TD 4,025 ft.

Hidalgo County: Hunt Oil Co. 1 Eldred E. McAllen et al, in Share 18 of Las Mestenas Gr., 5½ mi. NW from Hargil, dry, TD 9,021 ft.

Jim Wells County: Sinclair Prairie Oil Co. 1 Clara Driscoll, in Los Animas Solo Gr., 8 mi. SW of Ben Bolt, dry, TD 6,413 ft.

Nueces County: Heep Oil Corp. & Conroe Drlg. Co. 1 J. W. Richardson, Lot 4, Sec. 5, Subd. of W part of Mary J. Luby Petronilla ranch, 6 mi. SE of Driscoll and 3 mi. W of Luby field, dry, TD 7,513 ft.

Williamson County: James E. Smith 1 Albert Plueger, in H. White Sur., dry, TD 1,052 ft.

SOUTH LOUISIANA

Salt Dome Discovery Made Off Grand Isle

NEW ORLEANS.—Humble Oil & Refining Co. 1 Grand Isle, State Lease 801, off the coast of Jefferson Parish and several miles off Grand Isle, is a new salt-dome discovery with top of salt encountered at 7,607 ft. Operators are drilling ahead in salt below 8,092 ft. Sands with slight shows of oil were encountered from 7,094-7,106 ft.

A new gas-producing field for Calcasieu Parish has been opened by Sohio Petroleum Co. C-1 Sweet Lake Land & Oil Co., 34-10s-6w, 2 miles southeast of Sohio and General Crude B-1 Sweet Lake discovery well in the Bell City area. Drilled to a total depth of 12,010 ft., on initial flow test, the well made an estimated 1,000,000 cu. ft. of gas per day through a ⅛-in. choke with 2,950 psi. flowing pressure on tubing. Completion was made through perforations at 10,882-10,897½ ft.

Magnolia Petroleum Co. 2 Hollins-Mayer, 32-6s-11w, is opening a new shallow oil-producing horizon in the Oretta field of Beauregard Parish. Total depth is 4,466 ft. with 5½-in. casing set on bottom. Pipe was perforated from 4,403-4,415 ft. and began flowing dry gas and developed 1,600 psi., using a 7/64-in. choke. Pressure dropped to 1,350 psi. and well started flowing oil. When pressure dropped to 800 psi. on tubing, well was making 17 bbl. of clean oil per day.

Humble 3 R. H. Goodrich et al, has opened a new producing zone at the Weeks Island dome in Iberia Parish. The well was completed for an intial flow test of 292 bbl. of 34°-gravity oil per day through a 5/32-in. choke through perforations at 8,874-8,904 ft.

The Texas Co. 4 State-Barataria Bay, Lease 346, deep test at Queen Bess Island, continues to test. Total depth is 16,106 ft., and perforations for new test are at 15,862-864 ft.

The 23 new locations this week included 6 wildcat starts, 2 in Cameron and 1 each in Lafourche, Lafayette, Plaquemines, and Terrebonne parishes. Two successful exploratory tests were completed to open new oil sand at Delta Farms in Lafourche Parish, and a new gas-condensate pool in St. Mary Parish, Cote Blanche Island area. Two wildcats were dry, one each in Iberia and Livingston parishes.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Lafourche Parish: New oil sand, Delta Farms—The California Co. 14 Louisiana

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Delta Farms, Lease 1, 6-17s-23e, TD 12,888 ft., top sand 11,811 ft., perf. 11,811-819 ft., IP: 240 bbl. oil per day through a 3/16-in. choke, GOR 1,162, TP 900 psi., gravity 26.5°.

St. Mary Parish: New gas-condensate discovery Cote Branche Island area—The Texas Co. 12 State-Cote Blanche Island Lease 340, in West Cote Blanche Bay, Twp. 15s-7e, TD 13,824 ft., top sand 13,300 ft., perf. 13,300-358 ft., IP: 6 bbl. condensate per day and 7,700,000 cu. ft. of gas per day through 10/64-in. choke, TP 2,250 psi., shut-in pressure 4,800 psi., gravity 56.8°, no water.

SOUTH LOUISIANA WILDCAT FAILURES

Iberia Parish: Humble 1 Leon Braquet, 94-11s-7e, 6 mi. N of New Iberia production and 6 mi. SE of St. Martinville field production, dry, TD 11,202 ft.

Livingston Parish: Stanolind Oil & Gas Co. 1 Hammond Lumber Co., 25-7s-5e, 2 mi. SE of Springville townsite, dry, TD 11,600 ft.

MICHIGAN

Facility Wells Drilled For Summer Gas Storage

SAGINAW.—With Texas Panhandle gas flowing into Michigan for summer storage, Michigan Gas Storage Co. is stepping up its facility-well drilling operations. Last week it listed eight new drilling locations in Winterfield Township, Clare County, while completing three other facility wells in Clare's Summerfield Township.

Eighteen other oil and gas locations were reported during the week and there were 13 field completions for 3 oil wells, the 3 gas wells and seven dry holes, of which four were wildcats.

Best producer was Sun Oil Co. 2-A State-Beaver Creek in the new Beaver Creek field of Crawford County. After acidizing, the new well was flowing 200 bbl. a day, pinched. Cities Service Oil Co. 2 Dowd in Wise of Isabella rated 123 bbl. a day, and the third producer, Ervin Major 3 Nott in Deep River, Arenac County, was pumping 7 bbl. The Beaver Creek well is one of the state's deeper producers, its completion depth being 4,375 ft.

Completions were scattered over 11 counties, the 26 new locations in 13. In addition to the eight in Clare County, other locations are: three in Allegan, two each in Midland, Ogemaw, Mecosta, Oceana; one each in Kent, Montcalm, Ottawa, Kalkasha, Bay, St. Clair, and Arenac. J. S. T. Co. abandoned location originally set on the Worden lease in Section 19, Birch Run Township, Saginaw County.

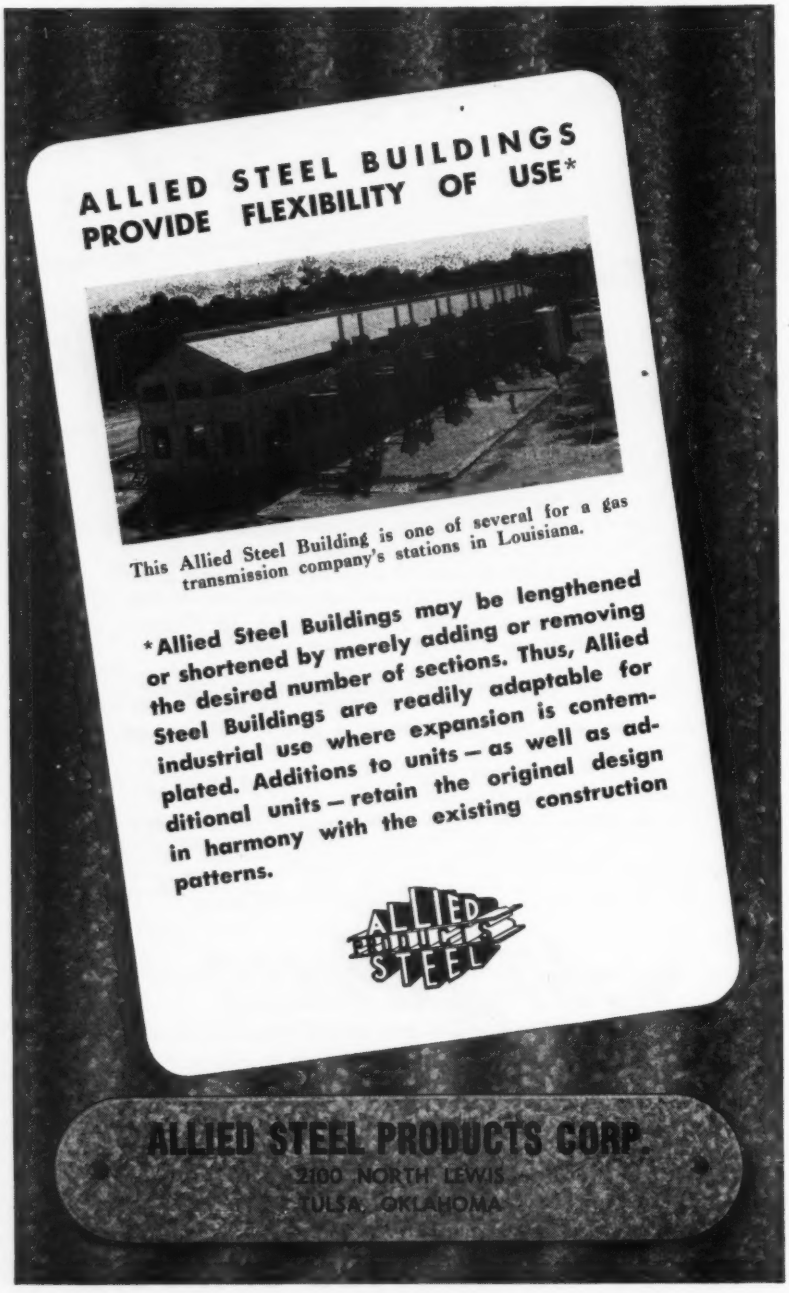
MICHIGAN WILDCAT FAILURES

Kent County, Cannon Township: S. L. McCall and Scott Drilling, Inc., 1 Elmer Shotwell, SE SW SW 4-8n-10w, dry in Traverse limestone; TD 2,500 ft.

Missaukee County, Caldwell Township: C. L. Maguire and Gordon Oil Co. 1 State-Caldwell, NE SE NW 30-23n-8w, dry in Detroit River; TD 3,822 ft.

Montcalm County, Fairplains Township: Sohio Petroleum Co. 1 Armor Rich, SW NE NW 2-9n-7w, dry in Traverse limestone, TD 2,814 ft.

Oceana County, Grant Township: Dale M. Leonard 1 Ronald Deater, NW SW SW 13-13n-17w, dry in Traverse limestone, TD 1,950 ft.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MISSISSIPPI

Three Producers Reported Completed in Past Week

JACKSON.—The California Co. 1 Cranfield Unit 4, in 47-7n-1w, in Cranfield field, Adams County, has been completed for a potential gage of 300 bbl. of 39.7°-gravity oil per day, tubing pressure 1,750 psi. Total depth is 10,350 ft., with perforations for completion at 10,300-10 ft.

At Gwinville field, Jeff Davis County, Magnolia Petroleum Co. 1 Federal Land Bank, 24-9n-19w, was completed as a gas-condensate producer, flowing 48 bbl. of condensate, 54° gravity, and 5,600,000 cu. ft. of gas per day, through a 20/64-in. choke, tubing pressure 2,608 psi., gas-oil ratio 117,000. Total depth is 8,284 ft., with perforations at 7,849-60 ft.

At Mallalieu field, Lincoln County, Humble Oil & Refining Co. 4 Mrs. M. C. Randall, 17-6n-8e, flowed a potential of 337 bbl. of oil per day through 20/64-in. choke, tubing pressure 140 psi. Total depth 10,501 ft. Production is through perforations at 10,460-89 ft.

Mississippi oil production reached a new high of 3,678,674 bbl. in March. Mallalieu field continues to have the highest daily well average of any of the oil fields in the state.

Four wildcat starts were reported this week, one each in Forrest, Lincoln, Marion, and Sharkey counties. A total of five development locations were reported, two each in Gwinville field, Jeff Davis County, and Yellow Creek field, Wayne County, and one for Baxterville field in Lamar County. Two wildcats were failures, both in Lincoln County.

MISSISSIPPI WILDCAT FAILURES

Lincoln County: R. J. Caraway 1 Perry Richardson, 15-6n-7e, dry, TD 10,704 ft. Tops: Yazoo 2,438 ft., Wilcox 4,060 ft., Austin 9,210 ft., Base Austin 9,490 ft., Tuscaloosa 9,745 ft., Marine Tuscaloosa 10,278 ft., Base Marine Tuscaloosa 10,541 ft., Massive sand 10,623 ft., Lower Cretaceous 10,677 ft.

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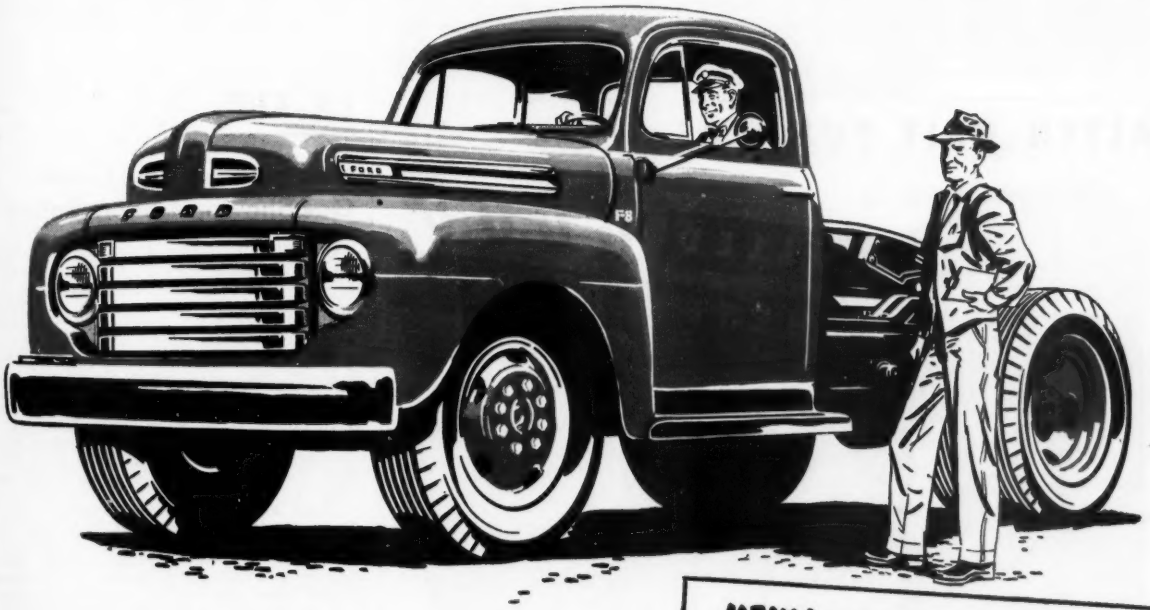

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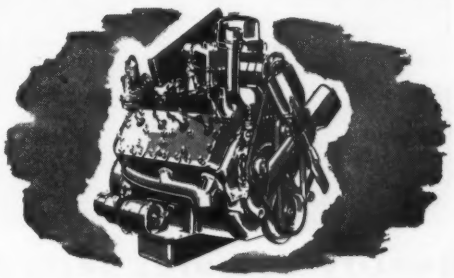

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APPALACHIAN FIELD

Columbian Carbon Gets Clear Fork Gas Well

PITTSBURGH.—In Grant district, Jackson County, West Virginia, Hope Natural Gas Co. has made a location for another wildcat on the Lee Batten farm, No. 9,230, which is scheduled for the Oriskany sand. Located on the Belleville Quad, it is 4.15 miles south 39° .05′ and 1.70 miles west 81° 35′, and starts at an elevation of 851 ft.

In Elk district, Kanawha County, United Fuel Gas Co. topped the Corniferous lime in 6,296 H. D. Withrow at 5,112 ft. from a surface elevation of 943 ft. and, in 1,227 F. C. Patterson drilled deeper at 5,202 ft. from a surface elevation of 988 ft.

In Clear Fork district, Raleigh County, Columbian Carbon Co. has a good well in 997 Rowland Land Co. with a gage of 1,431,000 cu. ft. of gas; Maxton sand 2,214 ft., gas 2,229-57 ft., total depth 2,257 ft.

In Lincoln district, Wayne County, E. C. Ware completed 1 Spouling as a Maxton sand gas well gaging 2,374,000 cu. ft. of gas, total depth 1,140 ft.

New locations totaled 15 and in West Union district, Doddridge County; Grant district, Jackson County; Cabin Creek district, Kanwha County; Hackers Creek district, Lewis County; Harts Creek district, Lincoln County; Browns Creek district, McDowell County; Grant district, Nicholas County; Murphy district, Ritchie County; Oceana district, Wyoming County.

In Shade Township, Somerset County, southwest Pennsylvania, the Peoples Natural Gas Co.'s wildcat R. F. Grove is drilling at 7,741 ft. In Springfield Township, Fayette County, New Penn Development Co.'s wildcat J. R. Smiley is 79 ft. in the Oriskany sand at 8,015 ft. with no showing.

New locations totaled 8 and in Boggs, Burrell, Kittanning, Mahoning, and Kiskiminitas townships. Armstrong County; Washington Township, Indiana County; Allegheny Township, Westmoreland County.

WEST VIRGINIA SUCCESSFUL WILDCAT

Upshur County, Warren district: Hope Natural Gas Co. 9,202 Mable Mick, 603,000 cu. ft. gas, Fifth sand, TD 2,725 ft.

WEST VIRGINIA WILDCAT FAILURES

Putnam County, Teays Valley district: Teavee Oil & Gas Co. 1 Russell Starkey, dry, Berea, TD 2,163 ft.

Teavee Oil & Gas Co. 1 James Fletcher, dry, Injun sand, TD 1,952 ft.

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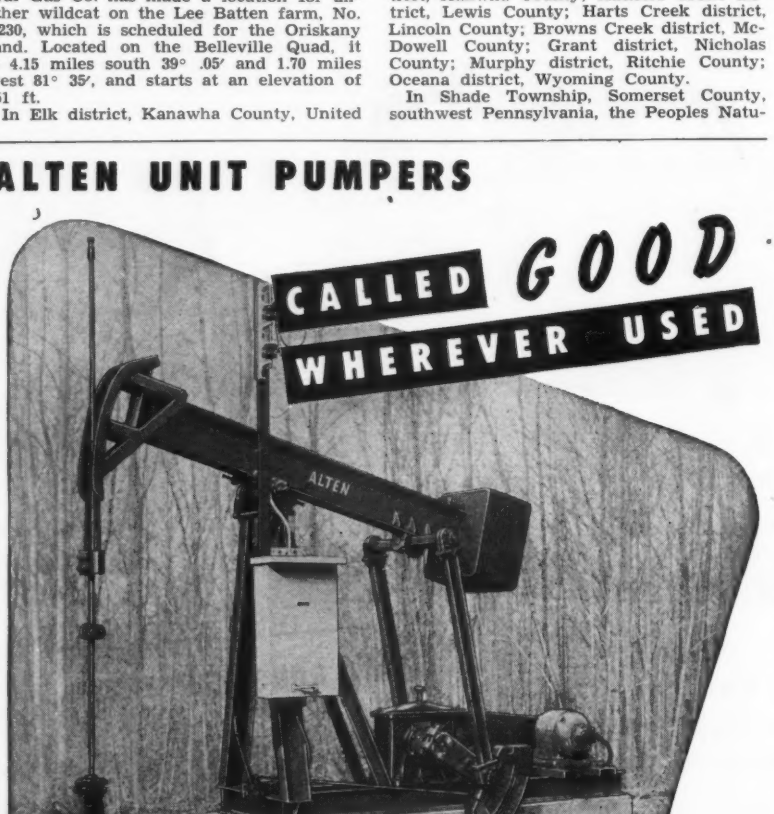

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Union Parish Test Cores Gas Show in Cotton Valley

SHREVEPORT.—Pan American Production Co.'s Union Parish wildcat, 8 miles south of Farmersville, 10-19n-1e, reported a slight gas show in cores from the Cotton Valley. Cores from 8,126-41 ft. recovered shaly and slightly sandy siltstone, with no shows. From 8,153-57 ft., the recovery was 2 ft. of hard, gray sandy shale, and 1 ft. of hard, tight fine sand, with no shows. From 8,157-75 ft., the 15 ft. recovered was: 6 ft. and 4 in. of hard shale, 2 ft. and 8 in. of medium-hard gray silty sand with fair gas odor, and 6 ft. of hard dark gray silty shale. Top on the Cotton Valley was 7,560 ft.

Union Producing Co. and Pure Oil Co. 1 Nebo, reworked Travis-Peak test in 30-14n-5w, Bienville Parish, drill-stem tested from 9,752-9,825 ft., total depth. Using 3/8-in. bottom and 1/4-in. top chokes, it produced a fair blow but had no working pressure and in 16 minutes the recovery was 90 ft. of mud and 125 ft. of salt water with no shows. Operators reamed to total depth with 8¾-in. bit and were preparing to drill ahead with 7⅞-in. bit.

Two and one-half miles north of the Caddo field, Caddo Parish, Chicago Corp. and L. E. Parker 1 W. M. Ledbetter, 4-22n-15w, were drilling below 4,752 ft. in the lower Glen Rose toward scheduled depth of 6,000 ft., or to the Pettit. It was drilled to 3,741 ft. and abandoned in 1946.

Calhoun & LaFitte Drilling Co. 1 Boone, north stepout from the Grogan field, in 25-11n-11w, DeSoto Parish, was unchanged in planning to run casing to test an oil show through perforations between 2,796-97 ft. Total depth is 3,001 ft. in the Paluxy.

A new 6,300-ft. wildcat was reported in Columbia County, Arkansas, at H. L. Hunt et al 1 D. W. Elledge, 6 miles south of the Irma field in 15-15s-21w. It spudded in last week and was drilling ahead below 1,700 ft.

Joe W. Kimzey et al 1 Grace Jones, 31-4s-15w, Grant County, set surface casing and was waiting on cement. It is a new 3,500-ft. wildcat 7 miles east of Malvern.

In Hempstead County, El Capitan Oil Co. 1 A. R. Avery, 4-11s-23w, had recovered bailer stuck at drilled-out total depth of 865 ft., and were attempting to pump the well. No report has been made as to the oil shows in the well.

Crow Production Co., Inc., et al 1 H. Moore heirs, 25-16s-25w, Lafayette County, was drilling below 4,250 ft. Planned depth is 5,000 ft.

ARKANSAS WILDCAT FAILURE

Columbia County: R. W. O'Meara 1 T. F. Moody, NE SE 12-16s-22w, dry, TD 7,253 ft., swabbed salt water and rainbow show of oil from perforations at 7,222-32 ft.

PERMIAN BASIN

Coke Well Prospective Ellenburger Discovery

MIDLAND.—Shamrock Oil & Gas Corp. 1 H. G. Wendland, southeastern Coke County wildcat, 7 miles southeast of Robert, in the Jose Antonio Guiterrez Survey 22, was showing for a prospective Ellenburger discovery after recovering pipe-line oil, with no water, on a drill-stem test.

Top of the Ellenburger was 6,230 ft., and cores to 6,241 ft. recovered 4 ft. of hard dolomite having slight fluorescence and a fair show of gas. Drilled on to 6,250 ft., a 45-minute drill-stem test between 6,235-50 ft. recovered 60 ft. of clean oil and 130 ft. of mud cut with oil and gas.

On an elevation of 1,880 ft., top of the Ellenburger was said to be 82 ft. low correlated with Seaboard Oil Co. and Southern Minerals 1 M. G. Reed, wildcat test 3 miles southeast in Section 1, HE&WT Survey. Other tops logged in the 1 Wendland were: Clear Fork 305 ft., Wichita Albany 1,400 ft., Wolfcamp 2,145 ft., Cisco series 3,035 ft., Canyon 4,860 ft., Palo Pinto 5,250 ft., and Strawn at 5,700 ft.

Seaboard's 1 Reed had total depth at 6,212 ft., and continued testing casing perforations from 6,180-98 ft., in the Ellenburger. First treatment with 500 gal. of mud acid resulted in only a slight show of oil and gas. Swabbing to 5,600 ft. from the top, after a second treatment, recovered some oil and gas. After swabbing down, it was credited with flowing 154 bbl. of oil and 281 bbl. of water in 24 hours. The first 15 hours was through 20/64-in. choke, and the last 9 hours was through 24/64-in. choke. Tubing pressure was 350 psi., and casing pressure was 850 psi.

Amerada Petroleum Corp. 1 Hattie Connel, Section 12, Block B-16, PSL Survey, flowed 234 bbl. of 44.4°-gravity oil in 13 hours, to extend Ellenburger production 1½ miles north in the Jordan field of southern Ector County.

Previously, the well had showed for production from the basal Simpson from 8,815-35 ft., where a 5-hour drill-stem test showed gas at the surface in 13 minutes and recovered some 6,600 ft. of 43°-gravity oil. Operators set 5½-in. casing on top of the Ellenburger at 8,891 ft., and prepared to complete in the Ellenburger. The 13-hour flow period was from open hole at 8,891-8,935 ft.

McAlester Fuel Co. 1 M. M. Fisher estate, Section 4, Block A-36, PSL Survey, north of the east side of Shafter Lake in Andrews County, continued testing after making several flows of oil from the Devonian. After retreating with 4,000 gal. through perforations from 11,020-11,090 ft., it was swabbed into pits for 5 hours then shut in for 7 hours to build up pressure. The first 7 hours after reopening, it gaged 129½ bbl. of oil. Size of opening during that period was not specified. The following hour, through ¼-in. choke, it gaged 35 bbl. of oil, then 25 bbl. of oil in 1 hour through ½-in. choke.

WEST TEXAS (DISTRICTS 8 & 7C) WILDCAT FAILURES

Gaines County: Atlantic Refining Co. 1-A J. O. Jones, Sec. 6, Blk. C-31, PSL Sur., 1½ mi. SW Adair field, dry, TD 4,887 ft., San Andres 4,510 ft., elev. 3,187 ft.

Glasscock County: John F. Camp & Sons et al 1 W. B. Currie, Sec. 37, Blk. 33, T&P Sur., 14½ mi. S Big Spring, dry, TD 3,510 ft., top limestone 2,485 ft., elev. 2,678 ft.

Hockley County: DeKalb Agricultural Association, Inc., 1 Ted Gray, Labor 2, Lodge 705, State Capitol Lands, 1¼ mi. N Yellowhouse field, dry, TD 4,580 ft., San Andres 3,370 ft., elev. 3,463 ft.

Reeves County: Hanlon-Boyle 1 Bessie Camp, Sec. 8, Blk. 56, T&P Sur., 3 mi. NE Orla, dry, TD 4,004 ft., Delaware sand 3,045 ft., elev. 2,775 ft.

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SOUTHEASTERN NEW MEXICO

HOBBS.—Amerada Petroleum Corp. 8 Andrews, 12-20s-36e, deep test in the Monument field of Lea County, plugged back from total depth of 10,827 ft. in the pre-Cambrian, to complete in the field's San Andres pay topped at 3,740 ft. Initial production was 400 bbl. of 33°-gravity oil a day, flowing through ½-in tubing choke, with gas-oil ratio of 602 cu. ft. On an elevation of 3,576 ft., it logged the following: base San Andres 5,160 ft., Clearfork 5,756 ft., Tubbs 6,355 ft., Wichita Albany 6,976 ft., Devonian 8,568 ft., Silurian 9,616 ft., Montoya 10,064 ft., Simpson 10,344 ft., and pre-Cambrian at 10,822 ft. The Ellenburger was not present.

On the southeastern flank of the Penrose-Skelly area, Lea County, Skelly Oil Co. 7 R. R. Sims, 3-23s-37e, scheduled 11,000-ft. wildcat, had flowing production in the Drinkard section of the lower Pesmian. A drill-stem test from 6,399-6,500 ft., open 4 hours, had gas at the surface in 27 minutes and oil in 34. It flowed 24 bbl. of oil the first hour, then about 12 bbl. an hour for the balance of the period. A second test from 6,501-60 ft., open 4 hours and 30 minutes, blew gas in 2 hours and 45 minutes and recovered 250 ft. of slightly gas-cut drilling mud. Further pay was indicated from 6,551-6,617 ft., where a 4-hour test recovered 750 ft. of slightly oil and gas-cut drilling mud.

Ralph Lowe, Midland, Tex., was reported to have made location for a 5,500-ft. wildcat in north-central Lea County, as the 1 Skelly-State, SW SW 22-12s-34e. Skelly 1 U. D. Sawyer, NE NE 33-9s-36e, offset test to the new Crossroads discovery, was moving in rotary rig. Planned depth is 13,000 ft.

SOUTHEAST NEW MEXICO WILDCAT DISCOVERY

Lea County: Mid-Continent Petroleum Corp. 1 Sawyer, SW SE 27-9s-36e, 6 mi. E Cross Roads, flowed 995 bbl. of 42.6°-gravity oil in 6 hours and 20 minutes, ¾-in. choke, daily potential 3,775 bbl., pay Devonian or Ellenburger, not fully determined at this time, topped 12,115 ft., perforated casing 12,115-215 ft., TD 12,258 ft., tubing pressure 200 psi., casing pressure 50 psi.

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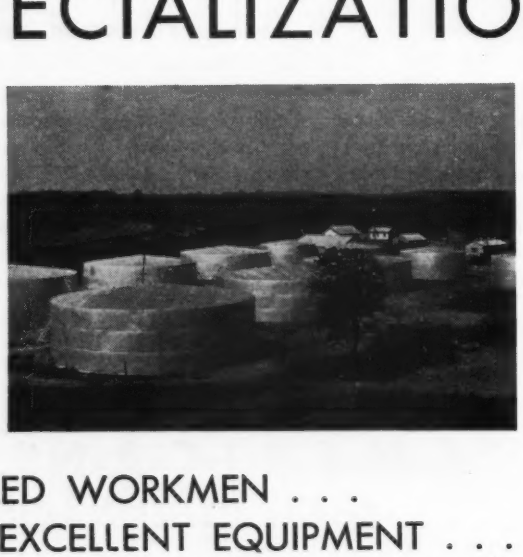

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KANSAS

Stafford County Well Has Good Recovery on Tests

IN Stafford County, Phillips Petroleum Co. has run casing at 1 Stafford, NW NW SW 33-21s-13w, after good recovery on three drill-stem tests in the Lansing-Kansas City, and a show of oil in the Arbuckle. A 40-minute test at 3,441-61 ft. recovered 3,240 ft. of oil; a 50-minute test at 3,516-23 ft. recovered 3,500 ft. of oil. Casing is set at 3,753 ft. at top of Arbuckle and total depth is 3,755 ft. The well is a south offset to the Phil-Han Oil Co. 1 Hufford, SW SW NW 33-21s-13w, which opened an Arbuckle pool last month and had a potential of 368 bbl. per day.

Lion Oil Co. 1 De Geer, NE NE SW 2-33s-15w, Barber County, has been completed with a 3,000-bbl. potential from the Viola in a bottom-hole bomb test. Viola was topped at 5,146 ft. and casing was set in the Arbuckle to 5,343 ft. Production is through perforations at 5,179-83 ft. Total depth is 5,434 ft.

In Barton County, Willis L. Hartman has set casing for an Arbuckle test at 2 Powell, NE NE NW 1-20s-13w, about 4½ miles west of the Hammer pool. Casing was set on top of the Arbuckle at 3,437 ft. A test of the area in 1944 had a good Arbuckle show in a hole drilled CWL NW NW of the same section but was not completed as a commercial producer.

Casing has been set at Hinkle Oil Co., Apex Petroleum Corp., and Benton S. Brooks 1 Sheppard, SW SW SW 34-21s-11w, about 3½ miles east of the Max pool in Stafford County, after a drill-stem test of the Arbuckle at 3,463-68 ft. recovered 25 ft. of oil-cut mud in 40 minutes. Total depth is 3,473 ft.

Leo Wentworth and C. D. Flournoy 1 Chambers, SE SE SE 10-29s-2w, Sedgwick County, has been completed in the Mississippian at 3,540-50 ft. with a pumping potential of 25 bbl. per day.

For the week, a total of 69 new locations were recorded including 11 from Barton County. Reports from Butler, Ellis, and Rice counties indicate six locations for each county. Rooks County was next in line with five locations.

KANSAS SUCCESSFUL WILDCAT

Sedgwick County: Wentworth 1 Chambers, SE SE SE 10-29s-2w, pumped 25 bbl. of 44.4°-gravity oil per day from Mississippian at 3,540-50 ft., Lansing 2,675 ft., Kansas City 3,528 ft., TD 3,550 ft.

KANSAS WILDCAT FAILURES

Barton County: Brack Oil Co. 1 Demel, NE NE NW 30-17s-12w, dry, TD 3,470 ft., Topeka 2,875 ft., Lansing 3,157 ft., Arbuckle 3,393 ft.

Butler County: Shell Oil Co. 1 Belle Grant, SW SW SW 5-25s-7e, dry, TD 2,750 ft., tight hole, no tops released.

Jefferson County: Inland Producing & E. E. Jackman 1 Browning, SW SE SW 16-9s-17e, dry, TD 2,445 ft., Lansing 765 ft., Bartlesville 1,832 ft., Mississippian 1,906 ft., Kinderhook 2,242 ft., chat 2,376 ft., Hunton 2,400 ft.

McPherson County: Westgate-Greenland & El Dorado Refining 1 Christenson, NW NW NW 12-18s-1w, dry, TD 3,363 ft., Mississippian 2,788 ft., Hunton 3,190 ft., Viola 3,316 ft.

Rice County: Herndon Drilling 1 Eaton, NW SW NE 28-20s-6w, dry, TD 3,430

ft., conglomerate 3,368 ft., Mississippian 3,373 ft.

Woodson County: O. R. Newcomer 2 Fegan, SE SE SW 2-26s-14e, dry, TD 1,412 ft., Bartlesville 1,380 ft.

N. CENTRAL TEXAS

Marble Falls Completion Shows High Potential

WICHITA FALLS.—Cities Service Oil Co. completed its 2 Mayes, Section 2,373, TE&L Survey, Marble Falls sand discovery in the Walsh (Bend conglomerate) field of southwestern Young County, for a daily flowing potential of 622 bbl. of oil, based on a 6-hour flow of 105.7 bbl. Pay zone is 4,288-4,315 ft., total depth. Gas-oil ratio was 897 cu. ft. Flowing pressures were not specified.

The 2 Mayes, considered a semiwildcat, drilled plug at 4,288 ft., and after running the swab, kicked off to flow into pits at the rate of 37 bbl. an hour, through ¾-in. choke. Changed to a 10/64-in. choke, it flowed 41.4 bbl. in 5 hours, filling available storage. Cities Service located its 3 Mayes as an offset, 330 ft. from south and 1,575 ft. from east lines of the same survey.

Kingwood Oil Co. 1 R. D. Garrett, G. W. Egery Survey A-269, has indicated production in the conglomerate, to extend the Chico field of Wise County 1½ miles to the northwest. A drill-stem test of conglomerate drilled from 5,288-5,320 ft. brought gas to the surface in 3 minutes, and oil at the end of 17 minutes. Total recovery was 350 ft. of clean oil. The well continued to flow while the tool was being brought out of the hole. Location of the extension is on a block of approximately 1,000 acres.

A southeast extension and new pay discovery for the Eskota field of Fisher County is indicated at Skelly Oil Co. 2 Pike Hall, G. W. Peck Survey 284, 8 miles north of Trent. A drill-stem test of the Palo Pinto reef limestone from 4,425-30 ft. brought gas to the surface in 3 minutes and oil in 30. Oil continued to flow throughout the 3-hour test, and in the last 1½ hours gaged 25 bbl. of oil. Size of choke and flowing pressures were not reported.

Wildcat drilling reports included the following: Konrad Sztykgold 4 King, Block 3, AB&M Survey, north outpost to the one-well Elm Creek (Marble Falls) field of northern Throckmorton County, was preparing to run a drill-stem test of the upper Caddo from 4,530-49 ft. Continental Oil Co. 1 Montague County, Westmorland Survey, 1 mile southwest of the town of Montague, drilled sand with odor from 4,880-95 ft. and was to make a drill-stem test of the interval.

S. D. Johnson and associates were to test a conglomerate section from 5,856-74 ft. at the 1-A Porter-Ayers, Section 55, Block 15, H&TC Survey, northeast of Fargo in Wilbarger County. The section being tested showed a good stain. National Associated Petroleum Co. 1 Davis, Section 3, Block 10, H&TC Survey, 1 mile south of Odell, Wilbarger County, was drilling below 6,250 ft. with no shows reported.

In northwest Jack County, Cox Drilling Co. was preparing to test the Caddo lime through casing perforations from 4,580-4,600 ft. at its 1 Roney, Block 3,326, TE&L Survey, 10 miles southeast of Antelope. Top of the Caddo was 4,579 ft. Total depth is 5,724 ft., with casing set at 4,713 ft.

Panhandle Producing & Refining Co. 1 Besch, Block 3,054, TE&L Survey, 5 miles northeast of Throckmorton, acidized with 1,000 gal. through perforations from 4,396-4,425 ft. and was swabbing out the load. The section treated was not identified.

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) SUCCESSFUL WILDCATS

Cooke County: R. W. Fair et al 1 Paul Rivoire, T. G. Murphy Sur., A-671, 1½ mi. W Gainesville, pumped 10 bbl. oil, 10 bbl. water a day, pay 1,929-32 ft., TD 1,969 ft.

P. G. Lake, Inc., 3-A Pace Bros., N. R. Reed Sur., 2 mi. SW Gainesville, pumped 35 bbl. 19.5°-gravity oil a day, sand 2,603-26 ft., TD 2,638 ft.

Jones County: Hester & Hester 1 George Walker, Sec. 46, Blk. 16, T&P Sur., 5 mi. NE Abilene, pumped 14 bbl. 37°-gravity oil a day, pay 1,759-61 ft., TD 2,000 ft. in shale, PB 1,789 ft.

E. H. R. Sabens et al 2 B. J. Rutledge, F. Sieberman Sur., 5 mi. NE Abilene, pumped 10 bbl. oil a day, pay 1,732-37 ft., TD 2,055 ft., PB 1,740 ft.

Young County: Warren Oil Corp. 1-K Allar, Sec. 1,653, TE&L Sur., SW corner of oil a day, 20/64-in. choke, Caddo pay 3,634-37 ft., TD, casing pressure 400 psi., tubing pressure 60 psi., GOR 340 cu.-ft. County, 3½ mi. SE Cities Service 1 Schlittler, flowed 174.7 bbl. 41°-gravity

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) WILDCAT FAILURES

Archer County: St. Anthony Oil Corp. 1 D. R. Woods, Blk. 4, Wm. Ainsworth Sur., 9 mi. NW Olney, dry, TD 1,346 ft. in shale.

Cooke County: R. W. Fair et al 5 Paul Rivoire, T. G. Murphy Sur., 3 mi. W Gainesville, dry, TD 2,105 ft. in shale.

Scott Bros. 1 Schad & Pulte, Thomas Carson Sur., 4 mi. SE Myra, dry, TD 2,028 ft., Ellenburger 1,935 ft.

Eastland County: T. L. Sessions et al 1 P. C. Grazier, Sec. 10, Blk. 1, H&TC Sur., 4 mi. NW Gorman, dry, TD 3,475 ft., Ellenburger 3,388 ft.

Fisher County: General Crude Oil Co. 1 Belle Sumrall, Sec. 90, Blk. 1, H&TC Sur., 7 mi. W Hamlin, dry, TD 6,063 ft., Noodle Creek 2,979 ft., Dotham 2,854 ft., Saddle Creek 3,200 ft., Flippen 3,240 ft., Canyon sand 4,425 ft., Reef lime 4,940 ft., Mississippi 5,875 ft., Ellenbur-

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Hamilton County: J. A. Beard and J. T. Owens 1 A. E. Egger, I. A. Jacobs Sur., 18 mi. SW Hamilton, dry, TD 3,683 ft., Ellenburger 3,562 ft.. elev. 1,100 ft.

Jack County: Fowler Fram Oil Co. 1 P. L. Rhodes, WCRR Sur., 3 mi. SE Bryson, dry, TD 2,013 ft. in sand.

Montague County: Bridwell Oil Co. 2 R. A. Adams, I. H. Meek Sur., 5 mi. NE St. Jo, dry, TD 2,764 ft.

Robertson & Ruegg 1 A. A. Hundley, I. Mabry Sur., A-565, 1½ mi. NW Mallard, dry, TD 6,431 ft., Caddo 6,126 ft., elev. 995 ft.

Nolan County: Hunt Oil Co. et al 1 May Sears, Sec. 60, Blk. 21, T&P Sur., 6 mi. E Sweetwater, dry, TD 6,286 ft., Ellenburger 6,140 ft., elev. 2,164 ft.

Stonewall County: General Crude Oil Co. 1 J. W. Kennedy, Sec. 169, Blk. 1, H&TC Sur., 1 mi. SW Aspermont, dry, TD 6,514 ft., Dotham 3,130 ft., Noodle Creek 3,273 ft., Canyon sand 4,870 ft., Strawn 5,680 ft., Caddo 6,120 ft., , Mississippi 6,250 ft., Ellenburger 6,421 ft., elev. 1,830 ft.

Taylor County: Sojourner Drilling Co. 1 A. J. Morgan, Blk. 6, League 146, Grimes CSL, 3 mi. S Merkel, dry, TD 3,040 ft., Dotham 2,222 ft., Noodle Creek 2,575 ft., Flippen 2,605 ft., Gunsight 2,858 ft., Reef 2,881 ft., elev. 1,884 ft.

Throckmorton County: Panhandle Production & Refining Co. 1 F. T. Beach, Sec. 3,054, TE&L Sur., 5 mi. NE Throckmorton field, dry, TD 4,900 ft., Caddo 4,290 ft., lower Caddo 4,407-25 ft., elev. 1,284 ft.

Wise County: Mid-Continent Petroleum Corp. 1 G. S. Kaker, S. Wood Sur., A-887, 1¾ mi. NW Bridgeport, dry, TD 7,307 ft., Caddo 4,820-40 ft., Barnett 6,500 ft., Ellenburger 6,977 ft.

Young County: A. R. Dillard 1 Maud Graham, Sec. 3,410, TE&L Sur., 8 mi. W Graham, dry, TD 3,683 ft., Palo Pinto 1,504 ft.

Warren Oil Corp. et al 1 Graham estate, Sec. 2,908, TE&L Sur., 2 mi. NE Murray, dry, TD 4,612 ft., Caddo 2,600 ft.

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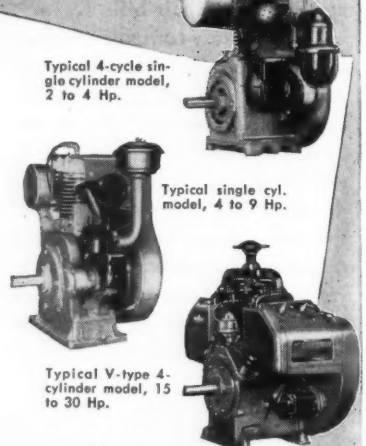

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OKLAHOMA

More Wells for the Ceres Area

B. BLAIR 1 Rolling, NE NE NW 9-22n-1w, Noble County, made gas on a drill-stem test at 4,566-96 ft. and flowed while breaking down the drill pipe. The pay sand was first reported locally as Bartlesville but later reports classify it as Burbank. Operator has run pipe to 4,565 ft. for further test of the sand. The well is about 2 miles southwest of the South Ceres pool and about ¼ mile above the extension of a straight line drawn through the wells connecting South Ceres with Southeast Ceres.

The final link in the narrow chain connecting South Ceres and Southeast Ceres pools in Noble County is Fourdee-Rhoades 4 Burnside, SW SW SE 26-23n-1w. The well was washed down and flowed 120 bbl. of oil through casing the first hour of test. Production is from an 80-ft. section of Bartlesville sand at 4,420-4,500 ft.

Logan County has another prospective pool opener at Wood River Oil & Refining Co. 1 Turner, NW SW NW 3-15n-1e, where it is reported that a drill-stem test of the Hunton at 5,030-50 ft. had gas in 5 minutes and recovered 80 ft. of oil and 30 ft. of oil-cut mud.

In the Lincreek area on the eastern border of Lincoln County, an old well drilled years ago appears to be a new producer. The well, W. H. Metzger et al 1 Bowers, NE NE SW 1-15n-6e, had two good 1-hour flows after operator ripped casing at points from 3,300 to 3,464 ft., shot the formation and treated it with acid. The first 1-hour run produced 68 bbl. and in another 1-hour check the well flowed 80 bbl.

Okfuskee County has a Hunton discovery prospect at J. E. Crosby and Warren 1 Crain, SW SW NE 19-12n-7e, where operator has set casing to 4,308 ft. after a drill-stem test taken at 4,311-30 ft., open for 1½ hours, had gas in 3 minutes and recovered 270 ft. of oil. The well is southwest of Paden pool and northwest of South Paden but with production indicated from deeper pay. Wells in the Paden pool produced from the Prue while South Paden production is from the Cromwell.

Barney Feagin is drilling ahead for a test of the second Wilcox at 1 Noble, SE SE SW 20-16n-3w, Logan County, after a show of oil near the base of the Pennsylvanian. A drill-stem test at 5,757-70 ft. with tool open for 25 minutes recovered 630 ft. of oil and 150 ft. of oil and gas-cut mud. Offset wells may be drilled to produce the Pennsylvanian.

OKLAHOMA SUCCESSFUL WILDCATS

Seminole County: Byrd Oil et al 1 Bender, NW NE SW 3-8n-8e, pumped 80 bbl. of 38°-gravity oil per day from Gilcrease at 3,179-94 ft.; Wewoka sand 1,050-1,100 ft., Allen sand 1,967-98 ft., Earlsboro 2,395-2,418 ft., TD 3,195 ft.

Stephens County: Gulf 1 Oklahoma National Bank, SE SE NW 32-1s-4w, flowed 689 bbl. of 28.2°-gravity oil per day from sand at 5,948-6,086 ft., TD 6,318 ft.

OKLAHOMA WILDCAT FAILURES

Creek County: Wilcox 1 Evans, NE NE SE 31-14n-7e, dry, TD 2,958 ft., Avant 1,032 ft., Dewey 1,128 ft., Hogshooter 1,459 ft., Layton 1,578 ft., Checkerboard 1,863 ft., conglomerate 1,910 ft., Oswego 2,710 ft., Prue 2,732 ft., Verdigris 2,843 ft., Skinner 2,912 ft.

Hughes County: Kingery 1 Smith, SE SE SW 22-8n-10e, dry, TD 3,446 ft., lower Booch 2,398 ft., Hartshorne 2,544 ft.,

Wapanucka 3,087 ft., Union Valley 3,349 ft., Cromwell 3,384 ft.

Kay County: Dirickson 1 Engleking, SE SE SE 33-29n-3e, dry, TD 3,399 ft., Mississippi lime 3,325 ft.

Kan-O-Tex 1 Hoerner, NE NE SE 12-27n-2w, dry, TD 4,221 ft., Hoover 2,540-70 ft., Oread 2,700 ft., Layton 3,370-3,470 ft., Checkerboard 3,730-70 ft., Oswego 3,850-4,080 ft., Bartlesville 4,160-65 ft., Mississippi lime 4,180 ft.

McClain County: Mid-Continent 1 Thomas, C NE SW 31-9n-3w, dry, TD 9,385 ft., Belle City 6,290 ft., Hogshooter 6,800 ft., Oswego 7,180 ft., Mayes 8,735 ft., Woodford 8,832 ft., Haragan 9,035 ft., Chimney Hill 9,300 ft., Wylvan 9,352 ft.

Okfuskee County: Wells 1-B Bernard, SE SW NW 34-11n-11e, dry, TD 1,873 ft., sand 1,750-1,860 ft., no shows.

Osage County: Sand Springs 1 Osage, SE NW NE 11-20n-10e, dry, TD 2,214 ft., Burgess 2,192 ft. with no shows, Mississippi lime 2,198 ft.

Wilcox 1 Osage, SW SW SW 4-27n-6e, dry, TD 3,091 ft., Oswego 2,596 ft., sand 2,692-2,703 ft., lime 2,725-86 ft., limy sand 2,798-2,810 ft., lime 2,884-93 ft., Mississippi chat 3,031-61 ft., Mississippi lime 3,061 ft.

Tillman County: Acme 1 Becker, SE SE SW 29-2s-17w, dry, TD 4,010 ft., no tops reported.

ILLINOIS

Edwards County Gets Possible Pool Opener

MATTOON.—Oriville Weston has set pipe at 1 Hasewinkle, NW NW NW 22-1n-14w, about 3 miles east of the North Sampsonville pool in Edwards County for a test of the lower O'Hara lime. A drill-stem test at 2,922-29 ft. with tool open for 1 hour had gas in 17 minutes and recovered 300 ft. of oil, 120 ft. of oil-cut mud, and 60 ft. of mud. Commercial production at this well would open a new pool.

In Richland County, Russell P. Johnson 1 Hall Heirs, SE NW SW 17-2n-10e, on a drill-stem test of the McClosky lime at 3,172-89 ft. had gas in 3 minutes and flowed natural clean oil in 26 minutes. Casing has been set at 3,170 ft. and total depth is 3,197 ft.

Joe Dunbar continues to test oil saturation in the Rosiclare at 1 Reping, NW SW NE 8-7n-7e, Effingham County. Pay is at 2,652-61 ft. and total depth is 2,689 ft. Operator swabbed 4 bbl. per hour after acid treatment and a 15-qt. shot.

In Hamilton County, Gulf Oil Corp. 1 Lasswell, NE SW SW 26-6s-5e, has been completed with an initial production of 329 bbl. per day from the O'Hara at 3,259-81 ft. after acid treatment. Total depth is 3,284 ft.

ILLINOIS SUCCESSFUL WILDCATS

Lawrence County: J. S. Young 1 Frick and Limp, SE SW NE 24-2n-13w, IP 5 bbl., Benoist, 2,292-2,307 ft., TD 2,534 ft.

Richland County: Arvin Drilling Co. 1 McDade, SW NW SW 17-4n-9e, IP 23 bbl., Cypress, 2,667-81 ft., TD 2,682 ft.

ILLINOIS WILDCAT FAILURES

Alexander County: Mid-Western Development Co. 1 Freedman, SW SW SW 10-15s-3w, dry, TD 1,105 ft.

Clay County: J. L. Black 1 Jorgenson, NE NW NW 24-4n-8e, dry, TD 3,038 ft.

Clinton County: Joe Reznik 1 Landrum, SE NE NW 20-1n-1w, dry, TD 1,628 ft.

Effingham County: Calstar Petroleum Co. 1 A. Hartke, NE NE NE 16-7n-7e, dry, TD 2,848 ft.

Washington County: A. M. Fowley 2 Piotrowski, NE SE SW 1-3s-2w, dry, TD 1,450 ft.

Wayne County: Illinois Mid-Continent Co. 1 J. G. Clark, SW SW NW 13-2s-5e, dry, TD 3,304 ft.

White County: Will I. Lewis 1 Neu Heirs, NE SE NE 28-4s-9e, dry, TD 3,410 ft.

CALIFORNIA

Discovery May Have Hit Gas Cap of New Oil Field

LOS ANGELES.—The joint venture of Jergins Oil Co. and North American Oil Co. in the Salinas Valley area of Monterey County, which has attracted considerable attention during the past few weeks as the result of an extensive saturated sand section which it encountered, has been completed as a gas discovery. Known as the 1 Orradre, 12-23s-10e, the well came in last week flowing at the rate of 7,500,000 cu. ft. daily through a ½-in. choke. Tubing has been lowered to the bottom of the well, but it continues to produce gas with a spray of oil. Gas pressures remained high even after lowering the tubing, recorded pressures being 800 psi. on the casing and 775 psi. on the tubing.

The 1 Orradre originally attracted attention 2 weeks ago when it cored saturated oil sand from 2,130-2,225 ft., and it was thought at that time that the well might lead to the first major discovery in the entire Salinas Valley. However, opinion is now expressed that this particular well may be on the gas cap of a large oil field. If such is the case, the field might be much larger than was originally believed.

The new discovery is located approximately 3½ miles southeast of San Ardo field, discovered by the Texas Co. 7 months ago and the only oil field in Monterey County at this time. In order to test the theory that the new well is on a gas cap, Jergins and North American have staked

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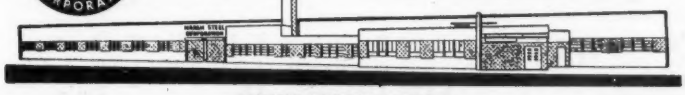

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two more wildcat ventures. The first of these is the 2 Orradre and is about 300 ft. southeast of the 1 Orradre, while the second is an extension well about 1 mile southeast. It will be known as the 1 Hamby. It is believed that the two new ventures are down structure from the 1 Orradre, and that they may make substantial oil producers.

Possibilities of oil production on the Turk Anticline in Fresno County again have attracted the interest of Superior Oil Co. and the company will put down a new venture in Section 25-17s-16e. To be known as the 1 Harnish Brothers, this wildcat is about 1½ miles south of a wildcat failure drilled by Superior in the latter part of 1946 to a total depth of 10,509 ft. It is understood that the new test will be somewhat deeper. To date approximately 15 wells have been drilled in search of commercial oil production on the Turk anticline. Several of these wells had good oil showings, and one even produced oil in commercial quantities for several days. However, a real commercial field has so far eluded prospectors in this area.

Richfield Oil Corp.'s second test in the Wheeler Ridge area of Kern County has reached a depth of 1,016 ft. and the company is rigging up to drill a third hole in the same area. The discovery well of this area, Richfield 72-29 KCL-Coal Canyon (formerly called the C-2 Wheeler Ridge-KCL), 9-11n-20w, currently is idle and waiting for installation of a pumping unit. Very little information has been released concerning the discovery well, but it has been reported that over 150 ft. of oil sand was cored and that the find is considered of considerable importance. Total depth of the well is 1,176 ft. and oil sand reportedly was topped at 1,000 ft.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, Paloma area: Richfield Oil Corp. 78-24 M. & L., 24-31s-25e, flowed 720 bbl. per day through ½-in. choke,

(Continued on page 150)

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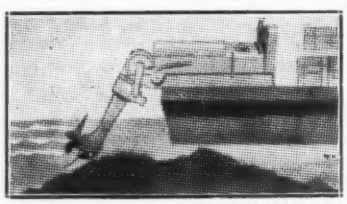

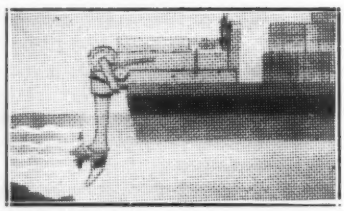

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OHIO, KENTUCKY

New Gas Pool Opened For Medina County, Ohio

COLUMBUS.—The oil showing from the Newburg horizon in the Lyons and Russell 1 McFadden, Section 18, Jackson Township, Ashland County, was acidized with 1,750 gal. and made 42 bbl. the first day with an estimated 100,000 cu. ft. of gas. The Newburg was topped at 2,579 ft. and drilling stopped at 2,597 ft.

Quaker State Oil Co. 1 John Hayman, Section 5, a wildcat in the southern part of Letart Township, Meigs County, found a nice show of oil in the Little Salt sand, but with too much water to handle. Drilling was continued to the Berea at 2,041-63 ft., which showed a small amount of oil. The well is now shut down for testing.

Another gas pool was opened in Litchfield Township, Medina County, by the Ohio Fuel Co. 1 A. M. McMichael in Lot 6. Upper Clinton at 2,626-33 ft. was dry and the second sand at 2,662-67 ft. gaged 504,000 cu. ft. of gas. Pools in the area have been small and irregular in area.

The second direct offset to the Medina sand discovery well on Luther Tippie, Section 15, Malta Township, Morgan County, was drilling in with the Clinton at 4,645-85 ft. dry, and the Medina at 4,751-60 ft. with a show of oil. The operator of the well, B. G. Bartley et al 2 Luther Tippie, is undecided about shooting.

The East Ohio Gas Co. has staked a location for a wildcat on F. & J. Salsgiver in Section 35, Yellow Creek Township, Columbiana County. The test will be to the Oriskany sand and is about 2 miles west of a previous test which had a gas showing along with some water.

Locations for the week are up to 33 from 12 counties. Ashland and Meigs are in the lead with six each and followed by Perry County with five. Completions totaled 29 with Lancaster and Stewart fields leading with six each.

OHIO WILDCAT FAILURE

Holmes County, Prairie Township: E. M. Sheilds et al 1 A. P. Flack, Sec. 3, Clinton 3,270-3,340 ft., TD 3,450 ft.

EASTERN KENTUCKY

ASHLAND.—Activities in the Eastern Kentucky field of operations noted only one completion during the week.

Kentucky-West Virginia Gas Co. completed Well No. 892, on the Robert L. Maynard property in Pike County at a total depth of 3,329 ft. The well brought 112,000 cu. ft. of gas in Shale, A. S.

New locations noted were: Well No. 901, Sherman Baldridge, Floyd County; No. 5,787, Elisha Branham, No. 5,818, Thomas Little, No. 5,820, Walter Cains, and No. 5,821, K. F. Leslie, all in Pike County.

WESTERN KENTUCKY

OWENSBORO.—Ashland Oil & Refining Co. and Miller & Shiarella 1 Whit Wright, 16-N-28, McLean County, has been completed with an initial production of 200 bbl. per day split between 2 pays. The upper pay is Jackson at 1,904-14 ft. and the lower is Cypress at 1,964-80 ft. Total depth is 1,986 ft.

Ashland and Miller & Shairella have also completed 1 R. T. Tichenor, 12-N-27, for 125 bbl. per day from Jackson, 1,899-1,912 ft. and Tar Springs at 1,652-83 ft. Total depth is 2,047 ft., plugged back to 1,912 ft.

Sohio Petroleum Co. also had a 2-pay completion at 4 D. W. Waltrip, 20-N-27, McLean County. Initial production was 145 bbl. per day from Tar Springs at 1,657-92 ft. and Jackson at 1,900-14 ft.

INDIANA

EVANSVILLE.—Vanderburgh County may get a pool opener at Joe Reznik 1 B. Edmond, NW SW SW 10-7s-11w, about 4 miles southwest of Evansville. A drill-stem test

of the McClosky at 2,435-39 ft. with tool open for 1 hour had gas in 20 minutes and recovered 420 ft. of oil and 180 ft. of oil-cut mud. Well also had a show of oil in the Pennsylvanian at 990-1,014 ft. Casing has been set at 2,430 ft.

George S. Engle is running at 1 G. E. Schmidt, NW NE SE 6-7s-11w, to test the McClosky after an 80-minute drill-stem test at 2,526-33 ft. had gas in 8 minutes and recovered 1,650 ft. of clean oil and no water. A show of oil was also recorded for the Aux Vases at 2,434-71 ft. Total depth is 2,533 ft.

INDIANA SUCCESSFUL WILDCAT

Posey County: Ashland Oil & Refining Co., J. Buchman, and C. E. O'Neal 1 E. Stockfleth, SW SW NE 24-5s-12w, IP 30 bbl., Waltersburg, 1,867-74 ft. and Cypress, 2,351-59 ft., TD 2,363 ft.

INDIANA WILDCAT FAILURES

Posey County: V. R. Gallagher 1 Owens, NE SW NE 11-5s-14w, dry, TD 3,103 ft.

Vanderburgh County: H. L. Cokes and Aurora Gasoline Co. 1 Ida Horn et al, SW NW SW 4-5s-10w, dry, TD 2,421 ft.

ROCKY MOUNTAIN

Wyoming Lease Activity Spurred by Deep Discovery

DENVER.—Success of Pure Oil Co. in its deep basin discovery at West Poison Spider has accelerated leasing of federal, state and patented lands throughout the entire state of Wyoming. During the month of April a total of 748 applications for oil and gas leases were made in the Wyoming state land office at Cheyenne, an all-time high for state lease sales. More than 100 applications for federal oil and gas leases have been processed weekly in the Cheyenne Federal Land Office, which handles the majority of oil and gas applications in the state.

Most of the recent leasing is in the Wind River Basin and in the southern section of the Powder River Basin. It is reported that Continental Oil Co. recently acquired leases approximating 200,000 acres in 83 townships in the southern portion of the Powder River Basin, with the majority of the lands state and patented. There are now a total of 35 seismograph crews working in Wyoming, with most of these in the Wind River and Powder River Basins. It is expected that this number will increase as a result of the Pure discovery on the seismic high at West Poison Spider.

In the meantime Pure is reported preparing to complete its discovery at 1 Unit, C NW SE 11-33n-84w, West Poison Spider, which is now the deepest oil producer in the world. The well is at 14,307 ft., total depth, with production probably from the Frontier formation below 14,211 ft. On a 41-hour drill-stem test the well flowed at the rate of 34 bbl. of 44°-gravity oil hourly, and made a gage of 835 bbl. in one 24-hour period through 76/64-in. choke. Although the well established a depth record for the Rocky Mountain region, the expense of the well at the present time has not been so high as several drilled in this area. The well was spudded August 17, 1947, and drilling has been comparatively easy. No trouble has been encountered in the test, with the exception of testing time during the past few weeks, when three previous attempts at drill-stem test failed. Two years ago Pure made a deep basin discovery based on seismograph work in Worland field, Washakie County, in the Big Horn Basin, Wyoming.

Sinclair Wyoming Oil Co. has found a new producing horizon for the Rocky Mountain region in its important new pay discovery at Lost Soldier field. The well is 2 Drayton-Consolidated, SE NE SE 3-26n-90w, and production was established in the Deadwood (Cambrian) formation when the well flowed at the rate of more than 10 bbl. of oil per hour from that formation. This is the first commercial production from the Cambrian in this region, although shows of oil were encountered in this horizon 2 years ago in Oregon Basin field. Top of the Cambrian was logged at 5,475 ft. and the well is at 6,026 ft., total depth. On 15-minute drill-stem test between 5,961-6,026 ft. the well made 1,260 ft. of clean oil, 380 ft. of oil and gas-cut mud, and 180 ft. of thin mud through ¼-in. choke. Top of saturation was found at 5,965 ft. with the best pay zone between 5,985-6,026 ft. The oil is 33.9° gravity. On a second test of this zone oil rose to the surface in 50 minutes and the well flowed 96 bbl. of oil in 9 hours with 2,200 cu. ft. of gas. This field has now produced from 11 different horizons since discovery in 1916. Five of the nine Wall Creek sands (Frontier) produced until developed, and subsequent production was established in the Dakota, Lakota, Sundance and Tensleep formations. Early this year oil was found by Sinclair in the Madison, with good saturation encountered in the Darwin sand of the Amsden, although no production has been established in that formation. The present well is the first below the Madison in the field and will be drilled to granite. Sinclair controls all producing acreage in the field.

Water has been recovered on drill-stem test of the Nugget formation by British American Oil Producing Co. at the Longs Creek wildcat in Fremont County, Wyoming. The well is 1 Government, C NW NE 5-31n-94w, southeast of the Sand Draw area. Top of the Nugget was logged at 2,737 ft. and the well is now drilling below 3,800 ft. for a test of the Tensleep, which is productive at Sand Draw.

An estimated flow of 8,500,000 cu. ft. daily of noncombustible gas has been gaged by Pacific Western Oil Co. in its deep Gordon Creek wildcat in central Utah. The well, which is the deepest in the state, is located in the C SE NE 24-14s-7e, Carbon County. At 10,980 ft., total depth, the operator made a drill-stem test between 10,890-10,980 ft. in the Kaibab with the above recovery. It is believed the gas has a high carbon dioxide content and that a dry ice plant will be installed in the area for commercial use of the gas. This well was originally drilled to 12,146 ft., total depth, in the Coconino and this formation tested approximately 10,000,000 cu. ft. of the "dry ice" gas. A fish was lost in the hole and it was necessary to set whipstock at 7,880 ft. and redrill the hole. The operator has not announced whether or not the test will be again drilled into the Coconino.

New operations.—There were 34 new locations this week, with 25 of the wells in Wyoming, 6 in Montana, 2 in Colorado and 1 in Utah. The Utah wildcat is 1 Unit, SE NW NW 2-22s-16e, in the Green River area, Grand County, where Amerada Petroleum Corp. has spudded on a 4,000-ft. Paradox test. This is Amerada's first attempt to find production in Utah and will be an interesting test on a well-known surface structure in the northwestern portion of the Salt Basin. This is the first of several wildcats to be drilled in the Salt Basin area during this year. East of the Green River area at Thompsons, Pacific Western Oil Corp. and Equity Oil Co. of Salt Lake City are now making location for a deep wildcat. In western Wyoming, General Petroleum Corp. is resuming operations on the Tip Top Unit wildcat at 81-7-G, NE NE NE 7-28n-113w, Sublette County, which has been suspended during the winter after casing was run to 937 ft., total depth. The well will be a deep test in the general overthrust belt on the west side of the Green River Basin, north of LaBarge field. Location has been announced for another wildcat in the San Juan-Salt Basin area of southwestern Colorado by the Western Natural Gas, Byrd-Frost, and Paul B. English Group. The new wildcat is on Glade anticline in Dolores County, at 1 Government, C SE NE 26-41n-17w, and the well will reportedly be drilled to granite. At the present time the operators are drilling a wildcat at Dove Creek, CNL NE NW 3-38n-19w, 20 miles southwest of Glade, and this test is now below 1,500 ft. A number of the new locations were for extension and pool wells in the Mush Creek area, Weston County, Wyoming, where development drilling has now established a daily production of 3,400 bbl. of 42°-gravity oil. A total of 18 rigs are running in the Mush Creek area at the present time. The balance of the new locations were for pool wells.

Completions.—A total of 26 wells were completed during the week with a total daily initial production of 1,867 bbl. Thirteen of the wells were in Wyoming, seven in the Rangely pool, Colorado, five in Montana, and one in Utah. In Wyoming a border-line commercial discovery was com-

(Continued on page 149)

LEGAL

Notice is hereby given that oil and gas leases on the following described Crow Tribal lands will be offered at public auction at the Crow and Northern Cheyenne Agency, Crow Agency, Montana, at 2 o'clock P. M., M. S. T., June 15, 1948.

Unit No. 1. Description: In Township 9 South, Range 37 East. Sec. 15: S½; Sec. 16: S½; Sec. 17: SE¼; Sec. 20: E½; Sec. 21: All; Sec. 22: All. Acreage 2400.00.

Unit No. 2. Description: In Township 9 South, Range 37 East. Sec. 28: All; Sec. 29: E½, SW¼; Sec. 32: N½, N½S½, Lots 1, 2, 3, 4; Sec. 33: N½, N½S½, Lots 1, 2, 3, 4. Acreage: 2331.73.

Unit No. 3. Description: In Township 9 South, Range 37 East. Sec. 31: NE¼, N½ SE¼, Lots 1, 2, 3, 4, 5, 6. Acreage: 474.58.

Unit No. 4. Description: In Township 9 South, Range 37 East. Sec. 13: SW¼; Sec. 14: S½; Sec. 23: All; Sec. 24: All. In Township 9 South, Range 38 East. Sec. 19: E½ SW¼, Lots 3, 4; Sec. 29: NW¼; Sec. 30: NE¼, E½NW¼, Lots 1, 2. Acreage: 2392.30.

Unit No. 5. Description: In Township 9 South, Range 37 East. Sec. 26: All; Sec. 27: All; Sec. 34: N½, N½S½, Lots 1, 2, 3, 4; Sec. 35: N½, N½S½, Lots 1, 2, 3, 4. Acreage: 2516.08.

Unit No. 6. Description: In Township 9 South, Range 37 East. Sec. 25: All; Sec. 36: N½, N½S½, Lots 1, 2, 3, 4. In Township 9 South, Range 38 East. Sec. 30: E½SW¼, SE¼, Lots 3, 4; Sec. 31: E½, E½W½, Lots 1, 2, 3, 4. In Township 10 South, Range 38 East. Sec. 6: NE¼, E½NW¼, Lots 1, 2, 3, 4, 5, 6. Acreage: 2669.22.

Unit No. 7. Description: In Township 9 South, Range 38 East. Sec. 29: S½; Sec. 32: All; Sec. 33: All. In Township 10 South, Range 38 East. Sec. 4: N½, Lots 1, 2, 3, 4; Sec. 5: N½, Lots 1, 2, 3, 4. Acreage: 2560.59.

This sale will be conducted under the regulations prescribed by the Secretary of the Interior (Part 195, Title 25, Code of Federal Regulations). The leases will be sold to the highest responsible qualified bidder for a cash bonus upon an acreage basis in addition to the royalty of 12½ per cent and rental of $1.25 per acre per annum. The successful bidder must deposit with the superintendent on the day of the sale a certified check or bank draft on a solvent bank in an amount equal to 20 per cent of the bid and of the first year's rental as a guaranty of good faith. The balance of the bonus bid and of the first year's rental shall be paid and the lease in completed form shall be filed with the superintendent within 20 days from the date it is received by the successful bidder for execution. Failure in those conditions may subject the bid to cancellation and the forfeiture of payments already made.

No individual corporation, partnership, company or association shall hold oil and gas leases covering Indian Tribal lands and restricted allotted Indian lands on any one Indian reservation in excess of 25,000 acres except in the state of Oklahoma, in which state there is no acreage limitation.

Leases shall be made for a period of ten years from date of approval by the Secretary of the Interior with the right of renewal for an additional period of ten years upon such terms and conditions as the Secretary of the Interior may prescribe and by showing to the satisfaction of the Secretary of the Interior that the leased premises are producing oil or gas in paying quantities.

The right is reserved by the Secretary of the Interior to reject any and all bids and to disapprove and reject prior to approval any lease made on an accepted bid; and should any bid be rejected or lease be disapproved through no fault of the bidder, after deposit has been made, such deposit shall be immediately returned. Each successful bidder shall pay a prorata share of the cost of advertising.

For further information call or write L. C. Lipport, Superintendent. Date: May 14, 1948.

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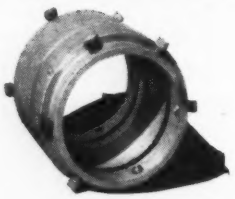

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CANADIAN FIELDS

Leduc Drilling Resumed Away From Wild Well

CHATHAM.—After a week of attempts to clear up the situation at Atlantic Oil Co. 3 wild well in Leduc field, announcement was made by the Petroleum and Natural Gas Conservation Board that an attempt would be made to halt the flow of oil and gas by pumping water into the formation under heavy pressure. Imperial Oil Co. 48, LSD 9, 22-50-26w4, ¼ mile west of Atlantic 3, recently cemented at 5,390 ft., is being used as an intake well, into which the water will be pumped.

Atlantic 3, LSD 12, 23-50-26w4, halted drilling last March just above the D-3 zone at 5,331 ft. When control head was clamped on the 300 ft. of surface pipe, which was all the casing in the hole, heavy gas pressure broke through the sides of the hole below the casing and seeped to the surface in an area surrounding the well. Efforts were made to plug the well and control the gas, and the situation did not become threatening until the frost went out of the ground and oil began to bubble out along with the gas, forming pools on the surface. The flow on March 12 was estimated 50,000,000 cu. ft. of gas and around 10,000 bbl. of oil daily, and at last reports had not diminished. Oil accumulated in a hastily contrived sump is estimated at a peak of 80,000 bbl.

The Alberta Conservation Board took over the well and has since been trying to clear up the situation. V. J. Moroney, assistant to the divisional manager of Imperial, was retained by the board to take full charge of field operations. To eliminate the fire hazard of the oil accumulated in surface storage, the Board ordered some 59 producing wells in the field closed down, so that the entire capacity of the Imperial pipe line to Nisku could be used for drawing off the accumulated oil. The line has a capacity of at least 8,000 bbl. daily, which can probably be stepped up to 12,000 bbl. Surface oil is also being pumped back into Atlantic 1 and 2.

Early efforts to control the wild well included clearing a shale bridge and pulling some 860 ft. of drill pipe in the hole, in the hope that with the hole cleared the oil and gas would flow normally instead of cratering. Plans for relieving the situation include the drilling of two or more directional wells, starting at a distance from Atlantic 3 and designed to tap the same hole at depth and draw off the flow. With this done, the original hole will either be put into condition for normal production or plugged.

M. L. Haider, general manager of Imperial's production department, states that the situation does not constitute an immediate threat to the field as a whole, and that if the well is got under control within a reasonable time no great harm will be done the oil reservoir. Continued uncontrolled flow over a lengthy period could affect gas pressures and the ultimate oil recovery, but the present flow would probably affect only the immediate acreage.

Leduc drilling. — While production from other wells in the Leduc field is shut in, drilling operations, outside the immediate area of Atlantic 3, are continuing. In the south end of the field, Continental-Globe-Leduc West 11, LSD 6, 5-50-26w4, topped the D-3 zone at 5,423 ft. and halted coring at 5,424 ft. Drill-stem test at 5,417-24 ft. showed 400,000 cu. ft. of gas with oil coming to the surface in 62 minutes, and recovery of 4,210 ft. of oil and 90 ft. of salt water. It is being abandoned, and rig moved to Continental - Leduc 8, LSD 11, 7-50-26w4. Another south-end test, Imperial 57, LSD 6, 5-50-26w4, finishing at 5,435 ft., in drill-stem test of D-3 zone at 5,417-27 ft., got a slight gas blow and 3,440 ft. of salt water, and has cemented back to 5,225 ft. for completion in D-2 zone.

Imperial 46, LSD 1, 27-50-26w4, in drill-stem test at 4,875-4,965 ft., got 75,000 cu. ft. of gas with 4,510 ft. of oil and 90 ft. of mud. Imperial 52, LSD 16, 20-50-26w4, finished at 5,329 ft. and was swabbed in. Home-Leduc 7, LSD 13, 21-50-26w4, finished in D-3 zone at 5,350 ft. with a good production, is shut in temporarily. Home-Leduc 8 has location in LSD 13, 21-50-26w4.

Northwest of the main field, Imperial-Woodbend 3, LSD 9, 16-51-26w4, in initial drill-stem test below 4,852 ft., got 1,400,000 cu. ft. of gas and recovery of 100 ft. of oil and 700 ft. of oil-cut mud. Imperial-Woodbend 2, LSD 4, 15-51-26w4, is in D-2 zone below 4,898 ft.

Turner Valley. — In the Turner Valley north extension, Foothills Oil & Gas Co. 27, LSD 9, 4-21-3w5, got Madison limestone at 9,510 ft., faulting back to the Hootenay formation at 9,589 ft. and to the Fernie at 9,755 ft. Five other tests are drilling above the limestone.

Taber.—In the Taber area, Standard Oil Co. of California has spudded an important new test in SW 16, 14-9-17w4, midway between the established East and West Taber pools. Taber-Province 76-16-A, LSD 12, 15-9-17w4, finished at 3,214 ft., is making 40 bbl. Taber-Province 72-15A, LSD 4, 15-9-17w4, is being put on the pump.

Pincher Creek. — Gulf Canadian-Pincher Creek 1, LSD 15, 24-3-29w4, deepening from 11,927 ft. after encountering a heavy gas flow with substantial naphtha recovery from the upper Madison, is below 11,969 ft. Drilling is to be continued to the lower porous zone, which has been the main producing horizon in the similar Turner Valley field.

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Completions and Footage Continue Steady Climb Established for Year

by Polly De Armond

FIELD and exploratory completions for the month of April reached 2,981, an increase of 273 wells, or 10 per cent, over last month, and an increase of 737 wells, or 32.8 per cent, over April 1947. This total figure brings completions for the first 4 months of the year to 11,169, as compared with 9,421 for the same period of last year.

Total footage for the month was 10,342,283 ft., an 8.4 per cent gain, or 801,321 ft., over depth drilled in March, and a 29.6 per cent gain to top the corresponding month of 1947 by 236,521 ft.

The rigs and drilling figure showed a marked increase with 186 more active rigs at the end of April than for preceding month, and 812 such operations more than at the same time last year.

Area Gains Over Last Year

In comparing April 1948 with April 1947, increases in completions were noted in all areas, with only one section reporting a slight decrease in footage drilled. California completions rose sharply to reach 261, an 80 per cent increase over last year, with a 44.6 per cent increase in footage. The Southern area of Arkansas, Louisiana, Mississippi, Alabama, Georgia, and Florida recorded 252 wells, a 75 per cent gain over 1947, and a 26.2 per cent gain in footage. The Texas-New Mexico area was up 46 per cent in completions to total 1,029, and footage increased 37.8 per cent.

The Rocky Mountain region continued its increasing development, reporting 57 completions, a 29.5 per cent gain over last year, with a 29.8 per cent gain in footage. Kansas' and Oklahoma's 567 completions reflected a 24.3 per cent gain, while footage increased 31.9 per cent.

In the Eastern district of New York, Pennsylvania and West Virginia, completions were up 15.5 per cent for a total of 431 wells, and footage was up 16.4 per cent. Ohio, Indiana, Kentucky, Illinois and Michigan, comprising the North Central area, increased 1.9 per cent in wells drilled, but dropped 3.7 per cent in footage.

SUMMARY OF COMPLETIONS, APRIL 1948

	Comp.	Oil	Prod.	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	Over 10,000 ft.	Total footage	Rigs and drilling
New York	101	51	108	0	50	101	0	0	0	0	146,068	161
Pennsylvania	260	134	294	17	109	208	51	1	0	0	418,992	259
West Virginia	70	12	82	44	14	39	28	3	0	0	178,097	205
Ohio	108	31	670	32	45	49	59	0	0	0	273,496	179
Indiana	60	33	2,185	3	24	49	11	0	0	0	111,191	86
Kentucky	46	16	1,046	9	21	36	10	0	0	0	73,159	55
Illinois	129	60	8,078	2	67	43	86	0	0	0	319,551	242
Michigan	41	20	1,804	1	20	17	24	0	0	0	102,570	105
Kansas	223	114	48,221	15	94	31	191	1	0	0	720,181	444
Neb., Mo., Iowa	0	0	0	0	0	0	0	0	0	0	0	11
Oklahoma	344	206	26,215	14	124	127	153	52	8	4	1,180,748	641
Texas	971	591	96,474	41	339	256	391	218	81	25	4,165,319	1,090
North	187	101	8,796	0	86	109	51	27	0	0	524,076	131
West Central	99	55	6,827	1	43	29	67	3	0	0	311,057	68
West	230	190	56,239	0	40	43	131	26	25	5	1,003,732	211
Panhandle	51	33	2,852	10	8	3	47	0	0	1	160,800	151
Eastern	41	16	2,772	7	18	4	19	11	5	2	218,022	63
Gulf Coast	174	95	10,816	10	69	14	39	73	32	16	1,090,463	221
Southwest	189	101	8,172	13	75	54	37	78	19	1	857,169	195
Louisiana	193	126	13,059	12	55	102	23	9	30	29	898,990	228
Northern	127	85	5,806	11	31	100	15	4	6	2	313,431	56
Southern	66	41	7,253	1	24	2	8	5	24	27	585,559	172
Arkansas	25	11	780	1	13	6	14	3	2	0	104,235	36
Mississippi	29	19	4,954	1	9	1	0	15	5	8	218,298	63
Ala., Ga., Fla.	5	0	0	0	5	1	1	2	0	1	29,517	7
Montana	14	6	532	2	6	7	6	1	0	0	38,767	78
Wyoming	28	22	5,905	0	6	3	22	1	1	1	116,652	118
Colorado-Utah	15	10	2,218	0	5	1	1	12	1	0	88,484	91
New Mexico	58	37	6,424	4	17	12	32	11	1	2	234,792	134
California	261	217	24,097	0	44	113	98	26	13	11	923,176	376
Total Apr. 1948	2,981	*1,716	243,146	198	†1,067	1,202	1,201	355	142	81	10,342,283	4,609
Total Mar. 1948	2,708	1,630	250,208	191	887	1,126	1,043	296	156	87	9,540,962	4,423
Total Apr. 1947	2,244	1,252	221,604	195	797	966	840	385		53	7,977,073	3,797

*Includes 173 service wells: N. Y. 50, Pa. 103, W. Va. 1, Ohio 6, Ky. 1, Kans. 1, Okla. 4, No. Tex. 5, Tex. Panh. 1, E. Tex. 1.
†Includes 14 distillate wells: Okla. 1, E. Tex. 1, Tex. Gulf 3, S.W. Tex. 1, No. La. 3, S. La. 5.

STATISTICS and T

WEEKLY WELL COMPLETIONS . . . WEEK ENDED MAY 22, 1948

	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1948				
	Comp.	Oil	Gas	Dry	Footage	1948	1947	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	30	15	0	*15	34,819	625	490	0	0	0	0	0	0	0	0	0	0
Pennsylvania	43	20	2	†21	103,690	1,076	1,190	0	0	0	0	0	0	0	9	13	22
West Virginia	21	1	14	6	47,272	291	303	0	0	1	2	3	3	0	20	28	51
Ohio	29	7	9	‡13	74,938	504	484	0	0	0	1	1	1	0	7	14	22
Indiana	18	9	0	9	35,824	356	219	1	0	0	2	3	5	0	1	11	17
Kentucky	20	10	1	9	26,487	246	217	0	0	0	0	0	3	0	0	6	9
Illinois	53	29	1	§23	143,074	762	726	2	0	0	7	9	16	0	1	124	141
Michigan	13	3	3	7	30,740	245	255	0	0	0	4	4	8	0	6	97	111
Kansas	70	33	14	§23	244,463	1,080	971	1	0	0	6	7	19	0	2	140	161
Neb., Mo., Iowa	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Oklahoma	82	54	2	§26	275,251	1,515	1,547	2	0	0	9	11	50	5	9	245	309
Texas	222	142	5	75	928,449	4,284	3,299	7	1	0	40	48	121	11	42	750	924
North Central (Dist. 7-B & 9)	90	46	1	‡43	271,609	1,315	1,020	5	0	0	15	20	48	0	6	250	304
West (Dist. 7-C & 8)	52	45	1	6	238,697	1,148	792	0	0	0	4	4	18	0	2	80	100
Panhandle (Dist. 10)	8	7	0	1	23,876	231	166	0	0	0	0	0	0	0	1	6	7
Eastern (Dist. 5 & 6)	6	1	1	4	29,191	202	191	0	0	0	3	3	4	1	0	50	55
Gulf Coast (Dist. 2 & 3)	30	20	1	9	208,787	685	613	0	1	0	7	8	30	9	9	170	218
Southwest (Dist. 1 & 4)	36	23	1	12	156,289	703	517	2	0	0	11	13	21	1	24	194	240
Louisiana	45	30	3	12	215,463	783	471	1	1	0	2	4	14	8	2	74	98
Northern	30	21	2	7	73,912	519	236	0	0	0	0	0	0	0	0	36	36
Southern	15	9	1	5	141,551	264	235	1	1	0	2	4	14	8	2	38	62
Arkansas	9	8	0	1	42,678	118	97	0	0	0	1	1	3	0	0	32	35
Mississippi	9	4	0	5	89,720	151	159	0	0	0	2	2	2	0	3	33	38
Southeastern States	0	0	0	0	0	17	17	0	0	0	0	0	0	0	0	15	15
Montana	5	5	0	0	10,699	96	68	0	0	0	0	0	1	0	0	7	8
Wyoming	13	8	0	5	43,588	155	79	1	0	0	1	2	12	0	0	17	29
Colorado-Utah	8	7	0	1	46,847	95	62	0	0	0	1	1	0	0	0	17	17
New Mexico	12	11	0	1	64,095	245	197	1	0	0	0	1	4	1	0	16	21
California	61	55	0	6	250,159	1,103	778	3	0	0	4	7	28	0	0	111	139
Total United States	763	451	54	258	2,688,256	13,747	11,631	19	2	1	82	104	290	25	102	1,750	2,167
Total previous week	783	446	44	293	2,875,752	12,984	11,017	23	0	7	95	125	271	23	101	1,668	2,063
Total May 24, 1947	614	351	78	185	2,179,207			15	3	6	69	93	248	32	67	1,406	1,753

Service wells included: *15, †21, ‡2, §1.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$2.17	....	....	....
19-19.9	2.19	....	....	....
20-20.9	2.21	$2.25	....	$2.12
21-21.9	2.23	2.27	....	2.14
22-22.9	2.27	2.29	....	2.16
23-23.9	2.30	2.31	....	2.18
24-24.9	2.34	2.33	$2.56	2.20
25-25.9	2.38	2.35	2.58	2.22
26-26.9	2.41	2.37	2.60	2.24
27-27.9	2.45	2.39	2.62	2.26
28-28.9	2.49	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.56	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.62	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point. †Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT, WEEK ENDED MAY 15

District—	Crude runs, daily avg.	Production (Thousands of barrels) Gasoline†	Kerosine	Gas & dist. oil	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines Gasoline*	Kerosine	Gas & dist. oil	Residual
East Coast	882	1,992	310	1,016	1,688	24,638	5,938	9,561	8,694
Appalachian:									
District 1	101	262	48	65	77	2,078	277	384	308
District 2	74	239	29	50	117	1,127	140	178	178
Ind., Ill., Ky.	900	3,189	395	907	1,173	21,397	2,347	4,450	3,739
Okla., Kans., Mo.	433	1,530	140	560	527	9,472	742	2,208	1,632
Inland Texas	238	1,035	106	182	428	3,440	627	421	943
Texas Gulf Coast	1,458	4,323	773	1,977	1,903	17,951	1,474	5,421	5,048
La. Gulf Coast	430	1,307	262	614	418	5,486	894	2,202	1,372
N. La. and Ark.	76	195	55	91	125	1,857	372	358	152
Rocky Mountain:									
New Mexico	13	43	7	12	27	109	25	26	32
Other Rocky Mtn.	148	473	27	208	292	3,237	118	668	928
California	887	2,553	101	1,118	2,227	17,593	1,111	10,390	29,904
May 15, 1948	5,640	17,141	2,253	6,800	9,002	108,385	14,065	36,267	52,930
May 8, 1948	5,602	16,963	2,144	7,126	9,242	109,313	13,572	35,117	51,868
May 17, 1947	4,902	14,833	2,220	5,740	8,271	99,041	10,837	32,109	44,447

*Finished and unfinished. †At refineries including natural blended.

Bureau of Mines crude-oil stocks 221,772,000 bbl. as of May 15—up 55,000 bbl. One year ago 237,303,000 bbl.

FLAT CRUDE PRICES

Representative posted schedules per bbl.	
East Texas	$2.65
Kettleman Hills, California*	2.14
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	5.00
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

TRENDS

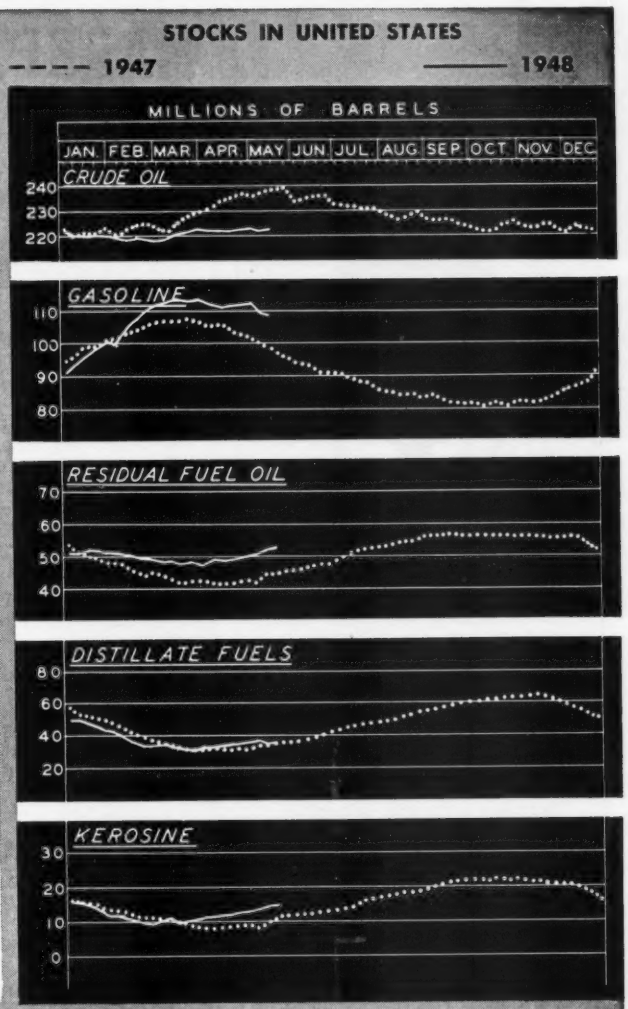
DAILY AVERAGE PRODUCTION FOR WEEK

	May 22 crude oil	B. of M. May demand	May 15 crude oil
Alabama	1,550	1,500	1,400
Arkansas	87,600	85,000	89,550
California	947,300	940,000	946,800
Colorado	45,490	48,000	45,000
Eastern	68,450	64,900	68,500
Florida	700	1,000	750
Illinois	170,500	178,000	170,800
Indiana	19,700	16,000	19,900
Kansas	305,100	300,000	293,300
Kentucky	25,600	26,000	25,700
Louisiana	466,275	477,000	466,925
North Louisiana	‡111,600	.....	‡112 250
South Louisiana	354,675	.....	354,675
Michigan	44,600	46,000	45,400
Mississippi	118,815	119,000	114,865
Montana	23,580	25,000	22,860
Nebraska	450	600	450
New Mexico	126,000	133,000	126,000
Oklahoma	416,600	420,000	418,100
Texas	2,419,325	2,450,000	2,419,325
Dist. 1 (Southwest)	26,850	.....	26,850
Dist. 2 (Southwest)	171,950	.....	171,950
Dist. 4 (Southwest)	255,650	.....	255,650
Dist. 3 (Gulf Coast)	492,850	.....	492,850
Dist. 5 (Eastern)	46,325	.....	46,325
Dist. 6 (Eastern)	121,900	.....	121,900
East Texas field	303,000	.....	303,000
Dist. 7-C (West)	44,975	.....	44,975
Dist. 8 (West)	687,875	.....	687,875
Dist. 7-B (W. Central)	45,000	.....	45,000
Dist. 9 (N. Central)	138,450	.....	138,450
Dist. 10 (Panhandle)	84,500	.....	84,500
Wyoming	147,690	152,000	141,440
Total United States	*5,435,325	5,483,000	‡5,417,065
Change from prev. wk.	up 18,260		

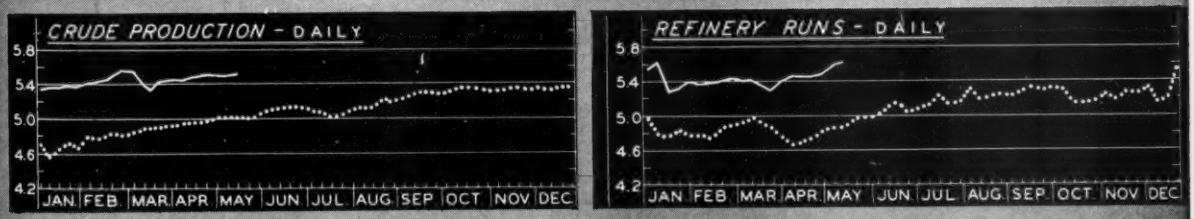
Total production January 1-May 22 ..... †776,751,045 bbl.
Same period last year (crude plus cond).. 690,227,815 bbl.

*Not incl. 73,480 bbl. condensate. †Incl. 7,660,385 bbl. condensate. ‡Revised.

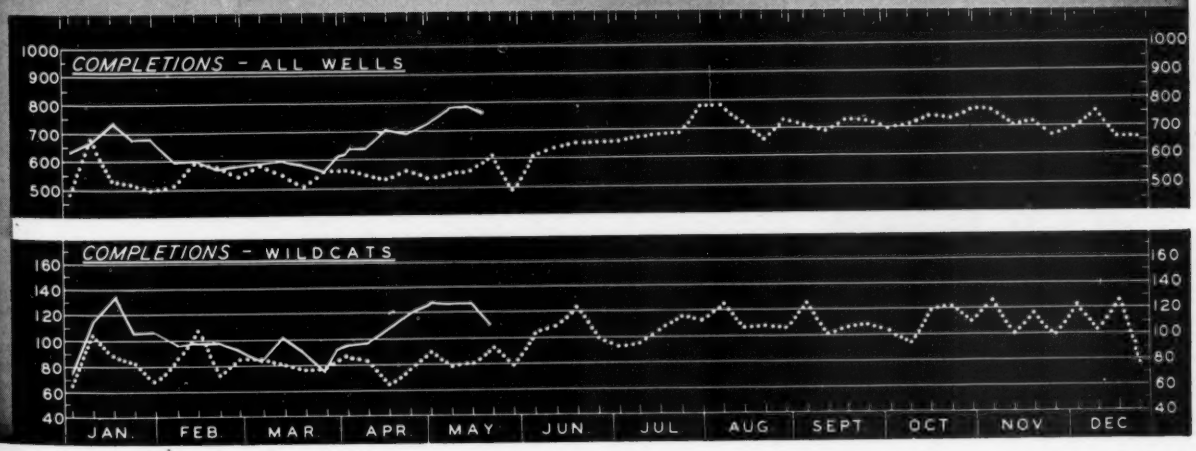
STOCKS IN UNITED STATES

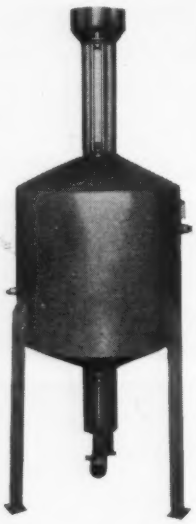


DAILY OPERATIONS



WEEKLY COMPLETIONS





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MARKETS

IN the Mid-Continent area open-spot market trading grew even tighter last week on gasoline in particular and most products in general. Demand in the past week was considerably stronger than in the previous week and since the first of this month it has steadily pyramided. Some increase in the price level of gasoline on the open spot market was noted, and one marketer reported that the price had gone up as much as ½ cent per gallon.

One Group 3 refiner said that he was behind on gasoline shipments by 300 cars. And demand, he reported, was steadily increasing. However, he said that he felt the price level would not increase substantially as smaller suppliers had to stay pretty well in line with the majors, and that few dealers could stand further increases in prices or premiums on this product.

Burning Oil Demand Strong

Demand for both light and heavy burning oils was much stronger last week, according to one supplier, and a considerable quantity of such products was moving on the spot market. Desire for storage in preparation for the coming heating season seemed to be the prime factor in making a more active market for heating oils.

One refiner said that he found No. 6 to be "moving fairly slow but with prices remaining firm," at the present time, but with increasing productivity by steel mills, stronger demand from municipal plants and industries, and the ever increasing search for material for storage, the market for No. 6 would soon be quite strong.

Tank cars were reported to be decidedly easier to obtain. Neither "dirty" nor "clean" cars any longer presented much of a problem. One supplier said he found no great difficulty in obtaining cars, but getting the material was causing "considerable looking" on his part. A firm market for asphalt shipments was keeping many of the "dirty" cars active.

Demand for all products, especially fuel oils, was reported heavier last week on the Gulf Coast. Spot cargoes were being sought for several vessels in the Houston area, and No. 2 for water movement was offered at 10½ to 11 cents per gallon, according to reports.

Gulf Motor-Fuel Price Up

Increasing seasonal requirements for motor fuel advanced spot-market prices to about 12¾ cents for house-brand. Kerosine, though somewhat weak in the interior, was said to be scarce on the Gulf area. Bunker C also was stronger amid reports that low-sulfur material was moving at prices ranging up to $3.20 per barrel and about $3.10 for high-sulfur oil.

In the New York Harbor area there was a noticeable tightening of No. 6 with an extreme scarcity of offerings on the open market. One independent confirmed the purchase of three cargo lots of No. 6 at the Gulf area for $3.50 early last week. At the same time he indicated when the oil arrived in the harbor next month he would be forced to increase his present $3.60 quotation in order to make a profit.

It was reported that three independent refiners in the New York Harbor area were informing all potential buyers that they were fully committed for the next 6 months. Another buyer stated that a $4 bid was not successful in attracting any supplies.

Prices generally remained unchanged along the Atlantic Seaboard.

Representative Quotations

Representative spot-market quotations of leading suppliers as of May 24, 1948. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor	Texas Gulf Coast
Regular gasoline, 73-75 octane	10½-12	11.6-12* 10.5-12.2†	10.9-12¾
Premium gasoline, 78-80 octane	11½-13	10.6-13.4	12.9-13½
42-44 w.w. kerosine	9½-10	10.3-12	10¼
No. 2 straw fuel oil	9¼- 9¾	9.4-10	9.05- 9¾
No. 6 residual	$2.50-2.65	$3.03-3.90	$2.56-3.00

*Branded (74-76 octane); †Unbranded (74-76 octane).

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	8½	8	8¼
Grade 18-55	10.2	9.6	9.9

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-14.5
750 vis., No. 3-4 neutral	15-17.25
2,000 No. 5-6 neutral	17-18½

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	30-33
200 vis. No. 3 neutral, 0-10 pp.	20-21

Western Pennsylvania

145-155 vis. 10 p.t. bright stock	47
180 vis. p.t. neutral	45

CRUDE-SCALE WAX

Mid-Continent

130-132 A.S.T.M. melting point	7-7½

EQUIPMENT MEN ... in the News

Kuehmsted Gets New Post With Santa Fe

Santa Fe Tank & Tower Co., Los Angeles, has announced the appointment of A. M. Kuehmsted to head its expanding cooling-tower division.

A. M. KUEHMSTED

Kuehmsted first entered the employ of the company in 1936 as an engineer in the cooling-equipment division. He was later appointed division manager, a post which he held for 6 years.

During the war, Kuehmsted distinguished himself as chief engineer in charge of Santa Fe wood-tank production for the armed forces. These tanks were used the world over for advanced base water supplies.

Early last year, Kuehmsted opened the New York office for Santa Fe; and just recently, turned that office over to Herbert Kunan in order to take on his new duties at the main office in Los Angeles.

As chief engineer of the cooling-tower division, Kuehmsted will coordinate the activities of the branch offices at San Francisco, Houston, Tulsa, and New York.

Rice Named Assistant Vice President

Empire Trust Co., New York, has announced the promotion of Charles Leslie Rice, Jr., to assistant vice president.

Since 1945 Rice has been engaged in the development of the bank's interests in the petroleum industry, which has included the establishment of an advisory service on oil financing and oil investments.

Rice is a graduate of Princeton University and during the war served as captain in the Signal Corps of the United States Army. In connection with his activities in the petroleum industry, Rice is vice chairman of the economics committee, petroleum division, American Institute of Mining and Metallurgical Engineers.

Bozeman Elected Vice President of Tuboscope

J. W. Bozeman has been appointed vice president and assistant general manager of Tuboscope Division of

J. W. BOZEMAN

CLINT LEWIS

HARRY BOZEMAN

B. H. PICKARD

Tubular Service & Engineering Co., Houston.

Bozeman has been stationed in Houston as sales manager for Tuboscope for the past 3 years, prior to which time he served the company as divisional manager for Louisiana and Mississippi.

Clint Lewis, former divisional manager of the Louisiana-Mississippi territory with headquarters at New Iberia, La., has been promoted to the position of assistant sales manager and transferred to the Houston headquarters.

Harry Bozeman, former branch manager of the South Texas district, Beeville, Tex., replaces Lewis as divisional manager in Louisiana and Mississippi.

Concurrent with the formation of the new Gulf Coast division of the company, comprising the former Houston and South Texas districts, B. H. Pickard was appointed to the position of Gulf Coast divisional manager. Pickard formerly was in charge of the Houston district.

Spicer Named Petroleum Sales Engineer

E. E. SPICER

Appointment of E. E. (Spike) Spicer as petroleum sales engineer recently was announced by Detroit Diesel Engine Division, General Motors Corp.

Spicer has many acquaintances in oil-field circles, having been associated with the petroleum industry since 1933. His well-rounded experience ranges from pumper and roustabout to the sale and servicing of diesel engines.

Spicer will operate out of the company's petroleum industry sales office under the direction of Arch F. Campbell.

Houdry Sales and Engineering Consolidated At Philadelphia

Consolidation of its executive, sales, and engineering organizations at Philadelphia has been announced by Houdry Process Corp. and Catalytic Construction Corp. Dr. C. C. Peavy, vice president in charge of sales and engineering, and Robert M. Cornforth, sales manager, will be located at the corporation's main office at 225 South 15th Street, Philadelphia.

Catalytic Construction Co., subsidiary of the Houdry Process Corp., has $31,000,000 in construction contracts on its books as of May 15, 1948. All work is under way, in stages ranging from actual building to design and engineering planning.

Yett to Caracas

Norman Yett, sales engineer for Continental Supply Co., will be transferred from the New York office to Caracas, Venezuela, about June 1. Before leaving, Yett will spend a few days in Continental's Los Angeles office. Mrs. Yett and a new-born son will be with him in Latin America.

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads, 10 cents a word. Minimum charge, $2.00 per insertion.
Centered Line, any ad, 75 cents.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

DISPLAYED, PER INCH

$10.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE at Burrton, Kansas: 1—8'x46', 16 Tray Absorber with ⅜" Shell and Head, $1,000. Unit down. Could be converted to gasoline storage tank reasonably. Cities Service Oil, Patridge, Bartlesville, Okla.

HALF TRACK SALE

Slightly used Half Track Trucks powered by 160 H.P. White Engines (Manufactured by White Motor Truck Company). Excellent for high speed towing, transportation under adverse weather conditions, mounting cranes or other special equipment; makes excellent shop or service truck. A combination Tractor—Truck—Wrecker that can drive on front and rear axles, or rear axle can be disengaged. Front tires are 8.25 x 20; ten speeds forward; two speeds reverse. Weighs approximately 14,000 lbs. Some models are complete with Tulsa Winch. Original cost to Government about $8,000.00. Sale Price $895.00 to $1250.00. Located at Pueblo, Colorado; Salt Lake City, Utah, and Dallas, Texas. Send inquiries to

BERNSTEIN BROTHERS
(Since 1890)
PUEBLO, COLORADO

EQUIPMENT FOR SALE

FOR SALE: Practically new Wilson Single Engine Counter shaft Mogul Draw Works complete with 145 GKU Waukesha engine, electrical starting equipment, gas, gasoline, and butane hookup. Water cooled brakes. LUKE GRACE DRILLING COMPANY, 1009 City National Building, Wichita Falls, Texas.

FOR SALE: One All-Steel Spudding Machine with O.C.S. sand reel, calf wheel, bull wheel, with spooling room for 6000' of ⅞ line, mounted on rubber, equipped to haul as semi-trailer, 60 ft. heavy duty mast. McComas Oil Field Supplies, Blackwell, Oklahoma.

FOR SALE—STEEL STORAGE TANKS

5—10,000 bbl. unused A.P.I. bolted type. 7 and 10 ga. with 14 ga. deck. Will erect on your site.

WM. ROSS
1 Drumm St. San Francisco, Calif.

PARTS FOR ARMY TRUCKS

New and Used

Largest stock in America, 6x6, 6x4, 4x4, 4x2. All items guaranteed. Largest auto wrecking house in the west with most complete stock of new and reconditioned parts for all cars and trucks. New jeep power units complete with radiators and stub shafts. Fast service.

PIONEER AUTO WRECKING CO.
732 W. 13th Ave. Denver 17, Colo.

WE BUY and SELL

Steel Pipe and Tubing
Pipe Fittings—Well Casing
Culverts and Valves

SONKEN-GALAMBA CORP.
2nd & Riverview, Kansas City 18, Kans.

EQUIPMENT FOR SALE

RECONDITIONED drilling equipment for deep or shallow wells. Spudders, beams, light rotaries, core drills. Tools, casing, cable. Good used equipment at money-saving prices. Pressey & Son, Pueblo, Colo

FOR SALE: Franks Seismograph rig with 1946 flat bed type water truck. All equipment and ready to start drilling. Seismograph Drilling Supply, Box 607, Britton, Okla.

FOR SALE: Near Garden City, Kansas, 5,000 ft. used Jones No. 7 one inch sucker rods—12½c per ft.; 2,500 ft. new Jones No. 7 one inch sucker rods—25c per ft. The Shallow Water Refining Company, Garden City, Kansas.

FOR SALE: Westinghouse, 25-horsepower, three-phase 1160 RPM motor. This motor rebuilt and is in first-class condition. Carper Drilling Co., Inc., Artesia, New Mexico.

FOR SALE: Marion 24' base anglesteel standard drilling rig—dead load capacity 437,000 lb., complete less tools, ready to use. Crumley & Sons, Box 598, Cut Bank, Montana.

FOR SALE

12—230 H.P. Type 10 Bessemer New 17" Power Cylinders complete ready to run with 16" to 18" Compressors. 1—230 H.P. Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 655, Evansville, Indiana

PUMPS

Centrifugal and Reciprocating Chrysler Industrial Engines. Write for list and prices.

H. A. McCARTHY
310 Thompson Bldg., Tulsa, Oklahoma
Phone 5-3296

FOR SALE

49-C Star Spudder with 165 H.P. motor (Gas or Gasoline)—in good shape for drilling to 5000'. Tools, equipment and 3500 drilling line, location near Durant, Oklahoma.

Write Box 1098
SHAWNEE, OKLAHOMA

STEEL CONSUMERS!

Do you need Plates or other Steel Products for tanks or for welded pipe?

Delegate your steel purchases to us and let us supply you with your needs.

Only end-users will be given consideration.

OVINGSTEEL, INC.
30 Church Street New York 7, N. Y.

REFINERY EQUIPMENT
DISMANTLED READY FOR IMMEDIATE SHIPMENT

Towers and Vessels	**Valves and Fittings**
Pumps and Compressors	**Tanks, bolted—welded—riveted**
Exchangers and Condensers	**Boilers**
Turbines	**Instruments and Controls**

Located at Enid and Tulsa, Oklahoma. Used less than 15 months.
Guaranteed first class condition. Inspection invited.

PETROLEUM EQUIPMENT, INC.

P.O. Box 887 **Thrasher Building**
Tulsa, Oklahoma **Telephone 2-6291**

FOR SALE
STEEL STORAGE TANK

1—5,500 Barrel
2—8,000 Gallon R.R. Tank Car Tanks Coiled and Non-Coiled
1—12,000 Gallon R. R. Tank Car Tank Coiled
3—9,800 Gallon Horizontal Steel Storage Tanks, 8' Diameter x 26' long.
Available at Once!

IRON & STEEL PRODUCTS, INC.
43 years' experience
13412 S. Brainard Ave., Chicago 33, Ill.
"ANYTHING containing IRON or STEEL"

SITUATIONS WANTED

CHEMIST: Graduate, 14 years' experience in oil and gas industry, desires position of responsibility. Experienced topping, thermal cracking, catalytic cracking and gas recovery operations. Box C-367, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE—Graduate Petroleum Engineer and Chemist. 15 years experience covering production, transportation, refining and research, including special work in gasoline testing and engine performance. Desire affiliation with major company. Box C-372, The Oil and Gas Journal, Tulsa Oklahoma.

LEASE AND DRILLING BLOCKS

FOR SALE: 1600 acres oil and gas leases on structure, with 3 well drilling, casing and shooting proposition. Depth of drilling 650 to 700 ft. W. P. Harley, Bowling Green, Ky.

40-ACRE oil lease in Brazoria County, Texas; abstract 57, John Cumming Survey. Mrs. B. Bacon, Box 118, Nevada, Missouri.

FOR SALE: Subject to prior sale we offer undivided one-half interest in oil, gas, coal and mineral rights in and under about 80,000 acres in 330 units in Eastern Iowa and Western Nebraska; conveyance by mineral deed. Offers to be considered June 5, 1948. Box C-386, The Oil and Gas Journal, Tulsa, Oklahoma.

SOUTHEASTERN NEW MEXICO
Leases, royalties and drilling blocks. Grant Keyes, 311 White Bldg., Roswell, New Mexico.

HAVE just leased 6,000 acres on approved structure in Weld County, Colorado. Well site located. Want backers to drill well immediately. Geological information and references on request. Willard Franks, Briggsdale, Colorado.

FOR LEASE by owner, 104 acres proven for both oil and gas at 1900 ft. $5.00 per acre. W. H. Mahon, P.O. Box 821, Brownwood, Texas.

EIGHTY ACRES for lease in oil belt, drilling contract, other leases available. M. Dalpe, 561 Surf Street, Chicago 14, Illinois.

FOR SALE: 8000 acres of Oil Shale in one body near Dubec, Colo. Heart of the oil shale deposits. John C. Herr, Wickenburg, Ariz.

HAVE ten thousand acres oil and gas leases, in Sierra County, New Mexico, on structure known as "The Alamosa Dome," good Government and other geology, surface shows positive inclosed structure, on direct trend with San Juan basin field, and Lea and Eddy County. Will give good share of acreage for test well to a depth of six thousand feet unless production should be found at a lesser depth. These are mostly Government and State leases with long terms and low rentals. This will bear rigid investigation. If interested, write C. M. Wilson, Box 226, Hot Springs, New Mexico.

DEVELOPMENT IN CUBA UNDER WAY

To expand drilling Jarahueca field producing 1000 b/d (37 A.P.I.) want parties furnish spudders for 2500' tools, casing. Drilling cost borne by us. We offer 1/10 first 5 wells plus value of equipment. Will also lease, sell lots and overriding royalties. Cracking plant in operation. Write to

CUBAN OIL ENTERPRISES
Aguiar 574 St. Havana, Cuba

LEASES ROYALTIES
PRODUCING OR NONPRODUCING
Texas, New Mexico, Oklahoma, Louisiana and Illinois.
Inquiries Invited
B. D. BUCKLEY
60 Broadview Drive, Clayton (5), St. Louis, Missouri

LEASE AND DRILLING BLOCKS

WHY NOT FILE for Government oil lease on reservation lands opened under new law. Its opportunity in developing area. S. W. Pressey, Pueblo, Colo.

ROYALTIES

ANDREW J. BARRETT
The Philtower
Tulsa, Oklahoma

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

SEE A. L. BOWLES, Ada, Oklahoma, for drilling deals, leases, royalties.

WE will buy producing or non-producing oil royalties. Send particulars. Standard Security Company, 115 Broadway, New York 6.

PROFIT BY BUYING
ROYALTIES WHERE
THE PLAY IS HOT
AND PRICES LOW!
The Rocky Mountain area is seething and one of the hottest spots is east of the Rockies in Montana, southeast of Gulf's major strike near Glacier Park. The big companies are pouring in and the time to buy royalties is NOW—ahead of production. This is when the real profits are made. This firm is in its 25th year and specializes in AHEAD-OF-THE-DRILL royalties, in major company blocks. WRITE US TODAY! Landowners Royalties Company, Montana Power Bldg., Great Falls, Montana.

WANTED

OIL REFINERY WANTED FOR PURCHASE
20,000 to 30,000 barrels per day capacity. Send full particulars, including photographs.
BOX C-383
THE OIL AND GAS JOURNAL
TULSA, OKLA.

LEGAL

Department of the Interior, Wind River Indian Agency, Fort Washakie, Wyoming, May 25, 1948. Notice is hereby given that SEALED BIDS will be received until 2:00 p.m., Friday, June 25, 1948, at the Wind River Agency, Fort Washakie, Wyoming, for the leasing of the following parcels of Tribal trust land, located in Fremont County, Wyoming, for oil and gas mining purposes: UNIT NO. 1. Twp. 6 North, Range 3 West, W.R.M. All interest in the S½ of Sec. 17; W½, S½ NE¼ and SE¼ of Sec. 18; All of Sec. 19; N½ of Sec. 20; NE¼, N½NW¼, SW¼NW¼ and NW¼SW¼ of Sec. 21; N½SW¼ of Sec. 28; NW¼, N½SW¼, N½SE¼ and SW¼NE¼ of Sec. 29; N½ and N½SE¼ of Sec. 30. Twp. 5 North, Range 4 West, W.R.M. All interest in the S½S½ of Sec. 9; S½S½ of Sec. 10; All of Sec. 13; All of Sec. 14; All of Sec. 15; E½NW¼ and NE¼SW¼ of Sec. 16; NE¼, E½NW¼ and NW¼NW¼ of Sec. 22; E½, NW¼ and N½SW¼ of Sec. 23; All of Sec. 24; N½NE¼ of Sec. 25; containing 6,923.76 acres. UNIT NO. 2. Twp. 6 North, Range 3 West, W.R.M. All interest in the S½SE¼ of Sec. 21, containing 80 acres. UNIT NO. 3. Twp. 6 North, Range 4 West, W.R.M. An undivided one-half interest in the E½ of an undivided one-half interest in the W½NW¼ and NW¼SW¼ of Sec. 16, containing 440 acres. Separate leases will be drawn on the applicable Government form for each of the described three units. Bids may be made on one or more of the described units. The right is reserved to reject any and all bids. The successful bidder or bidders will be required to pay the cost of advertising, such cost to be prorated if there is more than one successful lessee. The leases will be sold to the highest bidder for a bonus offer upon an acreage basis in addition to the royalty of 12½%. All bidders must enclose with their offers a certified check or bank draft drawn upon a solvent bank in an amount equivalent to at least 20% of the bonus bid, plus 20% of the first year's rental at the rate of $1.25 per acre per annum, as a guaranty of good faith. The checks are to be made payable to the TREASURER OF THE UNITED STATES. Special attention is invited to the fact that Unit No. 3 is being offered with the understanding that the lease to be issued therefor will cover only 50 per cent of the oil and gas mineral rights. The remaining one-half interest of the mineral rights for this tract is held in fee and therefor is not under the jurisdiction of this governmental agency. The bonus offered for the undivided ½ interest in Unit No. 3 shall be upon a per acre basis for the entire 440 acres. However, the rental for this one unit of undivided ½ interest will be only half of the prescribed rate of $1.25 an acre or at the rate of 62½ cents per acre per annum, or a total yearly rental of $275. The leases must be completed and filed with this Office within 20 days from the date they are received by the successful bidder for execution and accompanied by payment of the remainder of the bonus bid, the balance of the first year's rental, and a filing fee for each separate lease. Failure in any of these conditions may subject the bid to cancellation without further notice and forfeiture of payments already made. The lessee will be required to use diligence in drilling and producing operations, and the lessee alone or in conjunction with other lessees in the Crow Creek area shall commence the drilling of a test well at some location on the lands included in this offer for lease within one year from date of approval of the lease and diligently continue the drilling of such well to test to the satisfaction of the Geological Survey the oil and gas possibilities of the Tensleep formation, or to a depth of 5,000 feet, unless oil or gas in commercial quantities is found at a lesser depth or the Geological Survey shall determine that further drilling in the well would not be warranted. The lease or leases issued as a result of this sale will contain the usual unit operation stipulation to the effect the lessee will within 30 days of demand subscribe to and operate under such reasonable cooperative unit plan for the development and operation of the area, field or pool embracing the lands included herein as the Secretary of the Interior may determine to be practicable or necessary and advisable to adequately protect the rights of all parties in interest, including the United States. The leases to be issued for the described three units of Tribal land will be made for a term of 10 years from date of approval by the Commissioner of Indiana Affairs and as long thereafter as oil and/or gas is produced in paying quantities, in accordance with the provisions of the Act of May 11, 1938 (52 Stat. 347) and the regulations approved May 31, 1938, Title 25, Code of Federal Regulations, Part 186, as amended. A recent amendment to these regulations raised the lease acreage limitation to 25,000 acres for any one lessee. The rate of royalty will be 12½% of the value of all oil, gas, and/or natural gasoline unless the lessor, with the approval of the Commissioner of Indian Affairs, elects to take royalty in kind. The adequacy of the bonus offers will be determined by the Geological Survey. A suitable bond will be required, and such bond must be approved by the Department. The responsibility of complying with any requirements of the Federal Documentary Stamp Statutes will be left with the successful lessees. All bids should be addressed to the Superintendent, Wind River Agency, Fort Washakie, Wyoming, in an envelope plainly marked: BID FOR OIL AND GAS MINING LEASES, CROW CREEK AREA, TO BE OPENED 2:00 P.M., JUNE 25, 1948. For further information, call or write Mr. Waller, Land Division of the Wind River Agency.

Rocky Mountain Area

(Continued from page 137)

pleted in the Franks Fork area, Park County, by Taylor Oil Co. on a block farmed out from Stanolind Oil & Gas Co.

WYOMING SUCCESSFUL WILDCAT

Franks Fork, Park County: Taylor Oil Co. 1 Thelft, C SW SW 23-48n-103w, 4,370 TD, PB 4,161, pumped 35 BO 122 BW per day, acidized 1,000 gal. Dakota 2,135 Sundance 2,620, Phosphoria 4,144, Tensleep 4,299. Eelev. 7,100 ground.

WYOMING WILDCAT FAILURE

Madden, Fremont County: Carter Oil Co. 1 Shoshone-Madden, C NE NW 30-7n-1e (WRM), 1,270 TD, abnd., Phosphoria 345, Tensleep 540, Madison 1,169. Elev. 6,770 DF.

UTAH WILDCAT FAILURE

White Valley, Box Elder County: Northern Oil Co. 1 Government, NE NE SW 17-13n-4w, 2,013 TD, suspend. indef. Madison 2,008.

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CALENDAR

May

American Petroleum Institute, Division of Production, Rocky Mountain district spring meeting, Townsend Hotel, Casper, Wyo., May 27-28.

Natural Gas and Petroleum Association of Canada, General Brock Hotel, Niagara Falls, Ontario, May 27-28.

Gas Technology Short Course, sponsored by the Southern Gas Association, Texas A. & I. College, Kingsville, May 31.

June

Petroleum Industry Electrical Association, Petroleum Electric Supply Association, and Petroleum Electric Power Association, twentieth annual conference, Hotel Adolphus, Dallas, June 1-3.

Southern Gas Association, third annual short course in gas technology, Texas College of Arts and Industries, Kingsville, Tex., June 2-4.

National Oil Scouts & Landmen's Association, annual convention, Denver, June 3-5.

Petroleum Equipment Suppliers' Association, annual meeting, Broadmoor Hotel, Colorado Springs, June 6-8.

Society of Automotive Engineers, summer meeting, French Lick Springs Hotel, French Lick, Ind., June 6-11.

Pennsylvania Grade Crude Oil Association, twenty-fifth anniversary meeting, Hotel William Penn, Pittsburgh, Pa., June 17.

Rocky Mountain Oil and Gas Association, mid-year meeting of the board of directors, City Auditorium at Cody, Wyo., June 18-19.

Kentucky Oil and Gas Association, annual meeting, Hotel Lafayette and Phoenix Hotel, Lexington, Ky., June 17-18.

American Society of Testing Materials fifty-first annual meeting, Book-Cadillac Hotel, Detroit, Mich., June 21-25.

American Petroleum Institute, Division of Production, eastern district meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., June 30, July 1-2.

Canadian Gas Association, annual convention, Jasper Park Lodge, Jasper, Alta., June 30-July 3.

August

Appalachian Gas Measurement Short Course, eighth annual session, West Virginia University School of Mines, Morgantown, W. Va., August 30-September 1.

September

American Chemical Society, Division of Petroleum Chemistry, fall meeting, St. Louis, September 6-10.

The Instrument Society of America, third instrument conference and exhibit, Philadelphia Convention Hall, Philadelphia, September 13-17.

Pacific Coast Gas Association, annual convention, Hotel Casa del Rey, Santa Cruz, Calif., September 14-16.

October

American Institute of Mining & Metallurgical Engineers, petroleum division, fall meeting, Adolphus Hotel, Dallas, October 4-6.

American Association of Petroleum Geologists, midyear meeting, technical session and 3-day field trip, Pittsburgh, Pa., October 4-9.

American Gas Association, annual convention, technical section, Ambassador Hotel, Atlantic City, October 4-9.

National Lubricating Grease Institute, sixteenth annual convention, Edgewater Beach Hotel, Chicago, October 11-13.

American Association of Oilwell Drilling Contractors, eighth annual meeting, Rice Hotel, Houston, October 11-13.

Texas Mid-Continent Oil and Gas Association, twenty-ninth annual meeting, Fort Worth, October 14-15.

American Institute of Mining & Metallurgical Engineers, petroleum division, fall meeting, Elks' Club, Los Angeles, October 14-15.

November

American Petroleum Institute, annual meeting, Stevens Hotel, Chicago, November 8-11.

American oil Chemists' Society, fall meeting and technical sessions, Pennsylvania Hotel, New York, November 15-18.

March 1949

New England Gas Association, Hotel Statler, Boston, March 24-25.

NOMADS

Houston Nomads, second Monday of each month, The Houston Club, Houston.

Los Angeles Nomads, second Wednesday each month, Jonathan Club.

New York Nomads: Golf party, June 10, at Westchester Country Club. Golf party, Sept. 21, at Baltusrol Country Club, N. J.

California Fields

(Continued from page 136)

gravity 42°, 2½-in. tubing 11,305 ft., TD 11,334 ft.

Los Angeles County, Aliso Canyon area: Standard of California 2 Del Alsio, 29-3n-16w, pumped 46 bbl. in 4 hours, gr. 18.7°, water cut 38.0 per cent, TD 7,221 ft.

Puente Hills area: Hugh Alan Bardeen 1 Lautenbach, 10-2s-10w, pumped estimated 25 bbl. per day, gr. 15.8°, water cut 4.0 per cent, TD 2,009 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Kern Bluff area: Vedder Petroleum Corp., Ltd., 1 U. S. L., 12-29s-28e, dry, elev. 225 ft., Santa Margarita oil-stained sand 953 ft., TD 1,210 ft.

Mount Poso area: M. and S. Oil Co. 1 Fee, 12-26s-28e, dry, elev. 1,000 ft., Schist 953 ft., TD 1,030 ft.

Poso Creek area: R. B. Jackson 1 S. E., 28-27s-27e, dry, elev. 570 ft., Santa Margarita 1,878 ft., TD 3,000 ft.

Los Angeles County: Santa Fe Springs area: Standard of California 1 Houghton Comm., 36-2s-12w, dry, elev. 146 ft., TD 14,444 ft.

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